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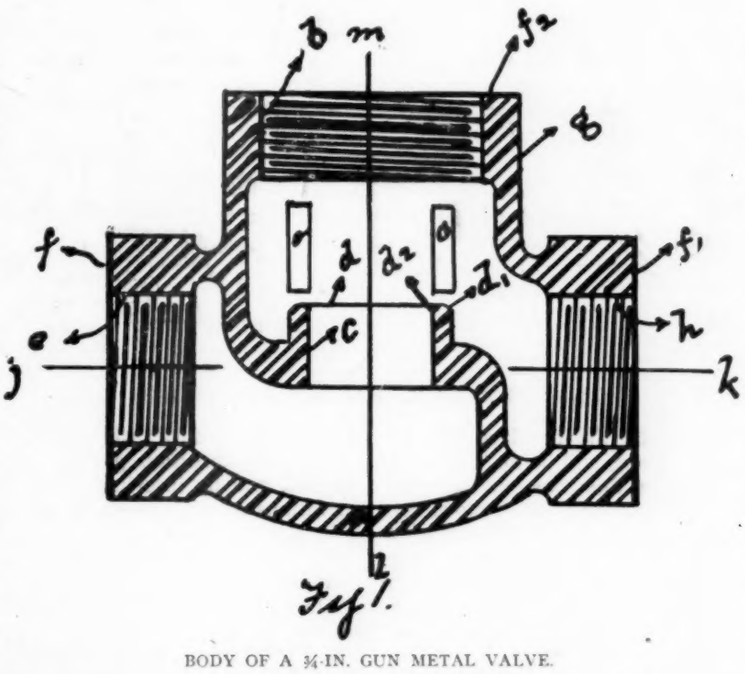
THE MANUFACTURE OF GUN METAL VALVES

A DESCRIPTION OF ENGLISH PRACTICE IN THE PRODUCTION OF STEAM METAL GOODS.

BY FANDORWAL.

The low prices ruling for valves up to, say 1-in. bore, makes it absolutely necessary for them to be made as cheaply as possible, to make a profit. It is also necessary that the valves should be well and accurately made. These conditions cannot be fulfilled unless properly designed and accurately made appliances and tools be used in the production. This article is intended to show how the above conditions can be successfully met. Figs. 1 to 9 are details of a ¾-in. valve, and Figs. 10, 11, 12, show the jig for holding the body (Fig. 1) while it is being bored, turned and tapped in the lathe. Figs. 1, 2, 3, 6, 7 are castings; Figs. 5, 9 are made from brass rod; Fig. 4 is made from brass tube, and Fig. 8 is made from copper strip.

The machinery required for manufacturing this valve successfully will be a molding machine, a rumbling barrel, an emery wheel, a chucking lathe, say with 6½-in. centers, with a six-hole turret on the slide, and a rest on the bed next to the headstock, with the tool box actuated by a lever, a semi-automatic capstan lathe with a six-hole turret, a single-speed brass finisher's milling machine, a sensitive drill, and a broaching press.



BODY OF A ¾-IN. GUN METAL VALVE.

The foundry is the department upon which depends the successful production of the valves—it is the place where they come into being. If the castings are not right, within narrow limits, the subsequent operations in the machine shop cannot make them so; therefore it is absolutely necessary that the patterns, core boxes and molding boxes, as well as the sand, should be of the very best for their several and respective purposes. The making of the foundry tackle and patterns should be carried out in the following manner:

Fig. 1. Only half patterns will be necessary for the body, as both sides are alike, and they (the patterns) will, of course, be made of iron and very carefully put on the plate, the center lines of the two pin holes at each *end* of the plate must be "worked to." The core prints at e h b must be of a generous length, so that the cores will be well supported, and thus an equal thickness in all parts of the body will be assured. Six half patterns can be placed on the plate, "gated" in the center. The molding boxes or flasks will be about 14 x 11 x 2¾ ins.; the inner surface of the sides will be concave to give the sand a better hold, and inner edges of the sides must be planed so that the top and bottom boxes will bed evenly upon each other. The pattern plate must accurately match the molding boxes. The top and bottom boxes must fit accurately, otherwise when the castings "come out" there will be heavy parting lines, requiring a lot of dressing off, and not unlikely a lot of valves will be scrapped, and will also interfere with the machining operations in such a way that it will be impossible to use jigs. Jigs demand accurate castings, and accurate castings are *absolutely* necessary for the production of Keese valves at a low cost. With proper tackle good castings can be produced without any difficulty at all, and at a lower cost than with poor tackle.

The "ears" or brackets for the pins should be thick, the pins hardened and ground, pin holes in the boxes and pattern plate bushed with hardened and ground steel bushes, four pins per pair of boxes. The holes in the boxes and pattern plate should be drilled from a carefully made drilling jig. This accuracy does not cost very much in a properly equipped tool room, and the facility with which good work is turned out soon pays for it.

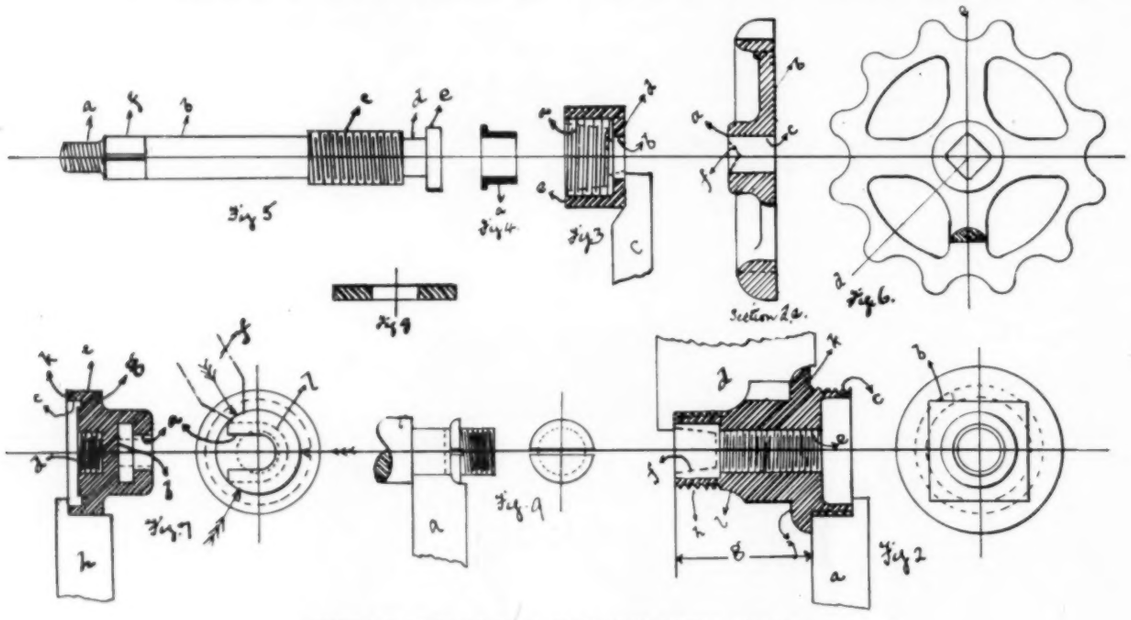
Molding boxes made in this manner will "turn over" and match perfectly; there will be no unsymmetrical castings.

Fig. 2 is the piece which screws into b, Fig. 1, and carries the spindle, Fig. 5. Twelve patterns of this piece may be put on the plates; two plates will be required. The portion g will be on one plate and c on the other; g will be in the bottom box. The dotted lines at f show how a little metal may be saved in each casting; this will leave its own core. For Fig 1, both top and bottom boxes are rammed up on the same plate, but in this case the bottom box is rammed up on plate g, and the top box on plate c. Fig. 3 is the hexagon gland nut which screws on to h, Fig 2. Eighteen complete patterns may be put on to one plate, and they will be made to have the core shown by the dotted lines, the top box will be rammed up on a plain plate. The boxes used for this casting may be second rate boxes, as there is no matching or turning over.

Fig. 6 is the cast iron wheel for rotating the spindle, Fig. 5. This wheel is designed so that the complete pattern can be placed on one plate, the top box will be rammed up on a plain plate. There will be no "fettling" required on the wheel made in this way, except just grinding off the "runner"—the rumbler will remove the sharp corners on side b. The boss will be cast solid with a center hole at f. Fig. 7 is the valve, and sixteen complete patterns may be put on one plate, and the opening, a, will leave its own core, as shown by dotted lines, down the face b, the undercut will be milled out, otherwise it woud be necessary to make a dry sand core.

The patterns, plates and molding boxes for the molding machine have now been arranged so that true castings may be obtained, and with a minimum of fettling and rumbling. The machining of the details or pieces may now be taken in hand and each piece will be taken in the order given in the figures, commencing with the valve body, Fig. 1. There are ten operations to be carried out, or performed on the body in the chucking lathe, and which must be completed at the one setting; it is therefore necessary in this case to use the jig, illustrated by Figs. 10, 11, 12. The valve body is supported at three double points, a a b, that is to say, in two Vs made to suit the hexagon ends of the valve, and in another one of the same angle to support the round portion, g; the body is held in position by a screw, k, in the piece, c, which is pushed into slot d, after the valve has been placed in the jig. To remove the body the screw k is slackened and piece c is pulled out of slot d—if c was a fixture or a part of the jig casting, screw k would have to be screwed up and down an inch each time a valve was put into the jig.

On the lathe faceplate is bolted an angle bracket (which is really a part of the jig) to carry that part of the jig shown in Figs. 10, 11, 12 in the horizontal plane. There are three holes, one at m to receive pivot j, and two at f and n on a line passing through the center of m and parallel to the faceplate. Corresponding to the holes f n in the angle bracket are the two holes of g in the round base plate 1; these four holes are bushed with hardened steel bushes. When a pin is inserted in hole f the jig is fixed for the operations on b, Fig. 1; when the jig is rotated 90 degs., g will coincide with hole h in the angle bracket, and by inserting the pin, the jig is set for the operations on h; when the jig is rotated 180 degs. in the opposite direction, g will coincide with hole f in angle bracket, and by inserting the pin, the jig is set for the operations on e. The jig is secured to the angle bracket with a set screw in the pivot j. This jig ensures the two axes of the valve being in the same plane and square with each other.



SHOWING DETAILS OF A ¼-IN. GUN METAL VALVE.

The first operation is facing f and slightly countersinking e with a flat tool having a square nose like a drill and a projection for the countersinking. Second operation; drilling, e, with a square nose drill; third operation, tapping e with a, top having only three threads tapered, and the shank carried in a box from which it becomes disengaged when the end of the tap has just passed through e, the lathe spindle is then reversed and the tap screwed out. When facing f, the turret slide is moved up to a stop, and thus f and f are always the same distance from center line 1 m.

The jig is now rotated 90 degs. for the next four operations. Fourth operation: facing f 2 and slightly countersinking b up to the stop—the distance from f 2 to the center line, j, k, is the same as from f to 1, m; fifth operation, drilling, b, and the four facings, a, which are guides for

Fig. 7, the end of the drill will be square, having two grooves to face the seating d, and round the corners d 1 and d 2 (this drill will be worked up to a stop); sixth operation, drilling, c; seventh operation, tapping b, with the same type of tap as used for e. The jig is now rotated

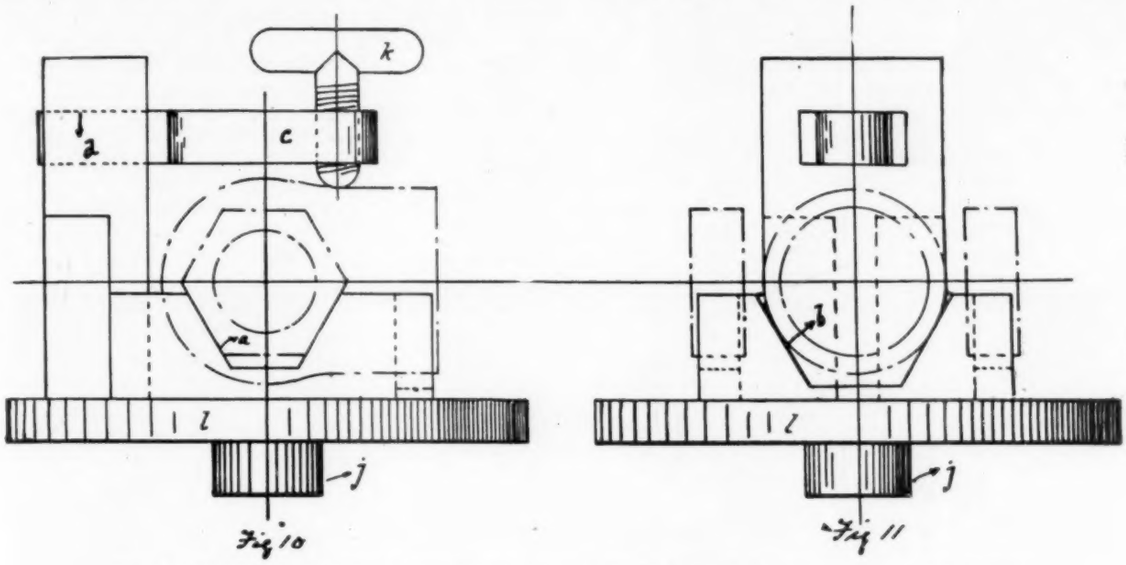


Fig 10 Fig 11

JIG FOR HOLDING BODY OF A GUN METAL VALVE WHILE BEING BORED, TURNED AND TAPPED.

180 degs. in the opposite direction to the last movement for operations 8, 9, 10, on f 1 and h, which are the same as for operations 1, 2, 3. The valve body is now ready for the flats at f and f 1, being milled with a fly cutter on the milling machine. The jig in this last position and the first three operations are performed on f 1 and h of the next valve body instead of f e.

Fig. 2. This casting will be held in a clutch which will grip the square b, the clutch jaws will be tapered to suit the "strip" or taper on the square, so that the piece will be held quite rigid. The flange j will be pushed against the jaws, thus giving to each successive casting the same lateral position. The first operation will be turning c with the simple form tool a; second operation will be screwing c with a die, which will become disengaged when up to the shoulder k, and revolve with the casting until the lathe is reversed, when it will screw off. For the third operation c will be screwed up to the shoulder k, into an internally screwed chuck fixed on the spindle nose and g will be turned with the form tool d. This tool turns h the right diameter, "trues up" the corners of square b, turns the radius l and flange j. Fourth operation: drilling f, the stuffing box, with a square nose drill. Fifth operation: drilling e with a twist drill. Sixth operation: screwing h with the same type of die as used for c. The seventh and last lathe operation: tapping e. The tap shank is turned down to pass through the hole it taps, and loosely held in a socket in the turret, so that it can be withdrawn by hand and pulled out, when the casting is screwed out of the chuck, thus making it unnecessary to reverse the lathe to get the tap out. The eighth operation, milling the square b with a "fly" cutter in the milling machine. For this operation e is screwed into a chuck on the index or dividing head. It will be seen that after the first operation all the others are performed from c, so that every portion of the finished spindle box is concentric with c.

Fig. 3. This casting, which is the hexagon stuffing box suit or cover, is held in a chuck with the jaws slightly tapered to suit the "strip," and d will be pushed against a shoulder on the chuck jaws. The first operation is drilling b with an ordinary flat drill; second operation, drilling a with a square nosed drill up to a stop; third operation, tapping a with the same type of tap as that used for tapping e, Fig. 1; fourth operation, facing e and chamfer the corners of flats with form tool c. After the fourth operation, the nut will be screwed on to a screwed mandril fixed in the spindle nose, operation 5 will be performed with the form tool c, which faces d, and chamfers

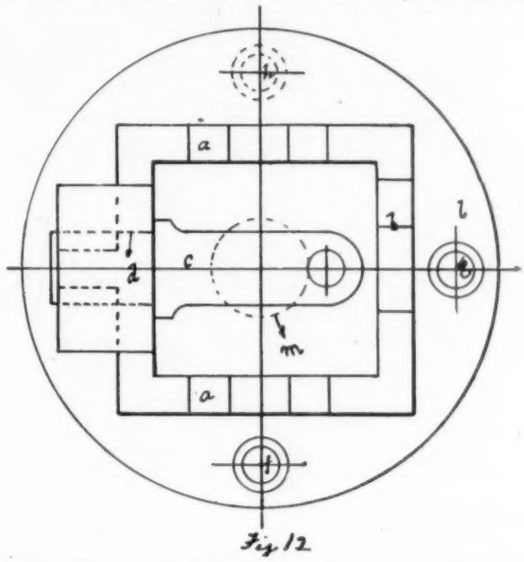


Fig 12

PLAN VIEW OF JIG FOR HOLDING BODY IN LATHE.

the corners. The sixth operation is milling the six flats, which will be done in the same way as Fig. 2. Fig. 4. The gland is made from brass tube of the correct internal and external diameters so that it is only necessary to turn a and part it off; this will be done on the semi-automatic.

Fig. 5. The spindle is made in the semi-automatic from brass rod, say .015 in. larger than the finished diameter of c. The first operation is turning b; second operation, turning c; third operation, screwing c; fourth operation, turning a; fifth operation, screwing a; sixth, turning neck d; seventh and last, lathe operation parting

off, it is not necessary to turn e. The eighth operation is milling the square f, which will be parallel. It is assumed that the nut for a will be purchased. Fig. 6. The hand wheels. There are only two operations on this, that of drilling a hole through the boss (the cast center hole being the guide for the drill), and afterwards making it square by broaching, which is done in the broaching press. Milling the square on the spindle and broaching the square hole in the hand wheel is a much better job than casting a taper hole in the wheel and filing a taper square on the spindle to suit.

Fig. 7. This casting will be held in a chuck having three jaws, the gripping end of which will be V-shaped, as shown at f, and the arrows show the position of the casting in the chuck with regard to the slot a. The shoulder g will be pressed against the gripping jaws so that the depth of c will always be the same. The first operation, drilling hole d with a square nosed drill; second operation, drilling out c with a drill having its end shaped, as shown, to form a groove 1/16 in. wide, so that it will be unnecessary to round off the corners on the copper disc, Fig. 8; third operation, tapping hole d; fourth and last lathe operation, turning e with the tool h which also faces k; fifth operation, milling slot a, b, with a small T mill, is performed on the milling machine, the casting being held in a collett gripping e.

Fig. 8. This is a copper disc having a hole in the center; it forms the valve seating. It is assumed that this will be purchased. Fig. 9. This is the screw for securing the disc (Fig. 8) in Fig. 7; it is made in the semi-automatic lathe from brass rod. The turning is done with the form tool a, which is shown in position for turning the second screw and rounding the head of the first one; the operations are turning, screwing, rounding head and turning screw part of the following one, parting off; the screw-driver slit is cut on the milling machine.

All the parts of the valve have now been machined, and in such a manner that they are interchangeable, and the various tools have been properly made, kept sharp and up to standard, so that no adjusting is required when the valve is fitted together. It will be merely a matter of assembling, which can be done by any handy man. The valve is well and accurately made, and any part can be renewed from stock without adjusting. To insure this the assembler should have a full set of standard pieces by him for comparison. Nothing further is required to make the foregoing system an unqualified success, except the careful consideration of the practical man. Ordinary machine tools only have been used, and the complete outfit of jigs and tools need not cost more than, say, $150, the cost of molding boxes, etc., being charged to general account.

NEWLY-DISCOVERED "SICKNESS" OF ALUMINUM

By Robert Grimshaw.

It has long been known that tin is subject to a disease which weakens it, the result of severe cold, so that many a valuable ancient piece of cast tin has been ruined. But now it has been discovered that aluminum also is subject to a similar disease, which decomposes articles composed thereof, and makes them fully useless. The first to mention this was Ducru (head chemist of the technical section of the French artillery), in "La Nature." He had remarked in many articles used in the military service that the surface appeared as though it were furrowed with little crevices, and covered with grayish-black powder, consisting of minute particles of metal separated from the main mass. After some time, larger holes are formed in the walls and instead of with metal these are filled with a powdery mass. Henri Le Chatelier believed this disease to be related to the so-called "tin-pest." That he was right in this belief is shown by the thorough scientific researches made by Professors Heyn and Bauer in the laboratory at Gross-Lichterfelde near Berlin.

The aluminum sheet from which the articles tested were manufactured was made by cold rolling, and then spun out into the form of cooking-pots and other kitchen utensils. The numerous efflorescences and spots on their surface lay in particular directions, running straight on the flat bottom and in curved lines on the convex sides. In all cases they corresponded to the direction of stretching of the metal, permitting the conclusion that there was a certain connection between the rolling and the disease. Analysis of the efflorescences showed the presence of water, alumina and lime. Professor Heyn then set himself the task of reproducing the phenomena in his laboratory. He took hammered sheets of various thicknesses and submitted them to the action of various agencies which he thought might have caused the sickness. From the first it was shown that impurities in the metal, and atmospheric changes, as causes, must be considered out of the question. It appeared, however, that water, and especially "city" water (that is, from the city water-pipes), had an unfavorable action. The thickest cold-worked sheets were most attacked by the city water.

After long and difficult experiments Prof. Heyn was able to decide, without, however, coming to an absolutely definite conclusion, that of the various ingredients in the water, the lime salts are the most injurious to aluminum; and that therefore articles of this metal should be subjected as little as possible to the action of limy water. As the result of these experiments both of the professors named offer the hypothesis that in the rolling process, two neighboring strips of the sheet metal obtain different degrees of electric tension. When they come in contact with solutions of salt (using the word "salt" in the purely chemical sense), they act like two different metals in electrolysis, the hardest worked strip playing the part of the positive electrode and being decomposed.

As a preventive of the disease, heating to 450 degs. C. = 842 degs. F., is recommended. Heyn has shown that an aluminum rod heated to this temperature was protected against the action of the city water even when exposed a long time thereto; while a similar rod, unheated, was perfectly disintegrated. There is, however, reason to fear that such a temperature could make the articles soft and less durable. So it is a question if the spinning or other process cannot be conducted at such a temperature as to make the articles proof against the disease and yet not be rendered less durable by the extreme heat. Contact with the city water naturally cannot be avoided in the average kitchen; and thorough drying after use is not always practical. Perhaps some waterproof coating will be discovered that will render the vessels immune to the attacks of the hard water as above mentioned.

PRODUCTION AND CONSUMPTION OF REFINED COPPER.

The total production of new refined copper in 1911 was 1,433,875,026 pounds. This was the largest output in the history of the industry, exceeding that of 1910 by 11,835,893 pounds.

The apparent consumption of refined new copper in the United States in 1911 was about 681,700,000 pounds. In 1910 it was about 732,400,000 pounds.—U. S. Geological Survey.

MAKING BABBITT AND BABBITTED BEARINGS

By Jesse L. Jones.*

Mr. Jones, who is a regular contributor to The Metal Industry, has written a very interesting article relative to his company's practice in the manufacture of babbitt metals. The article has been published in the American Machinist and we give it below practically in full.

The Westinghouse Electric & Manufacturing Co. adopted two principal babbitts, viz.:

A tin-base babbitt that is very easy flowing and suited to pouring extremely thin linings. This babbitt is much tougher and but slightly softer than the original genuine babbitt formula which is often referred to as the "U. S. Government Standard."

lead, "off grades" of tin and antimonial lead results in inferior babbitt and unsatisfactoty bearings, and is therefore most carefully guarded against.

While the amount of copper in most babbitts is small the use of the electrolytic grades is to be preferred, as some of the "Lake" brands are high in arsenic and this may cause poor adherence of the babbitt lining to bronze shells.

Most of the brands of lead on the market are almost chemically pure but they contain varying amounts of dross and oxide and the only practical way of testing them is to run down 100 lbs. or more in a graphite crucible, boil up with green hickory wood, skim off the

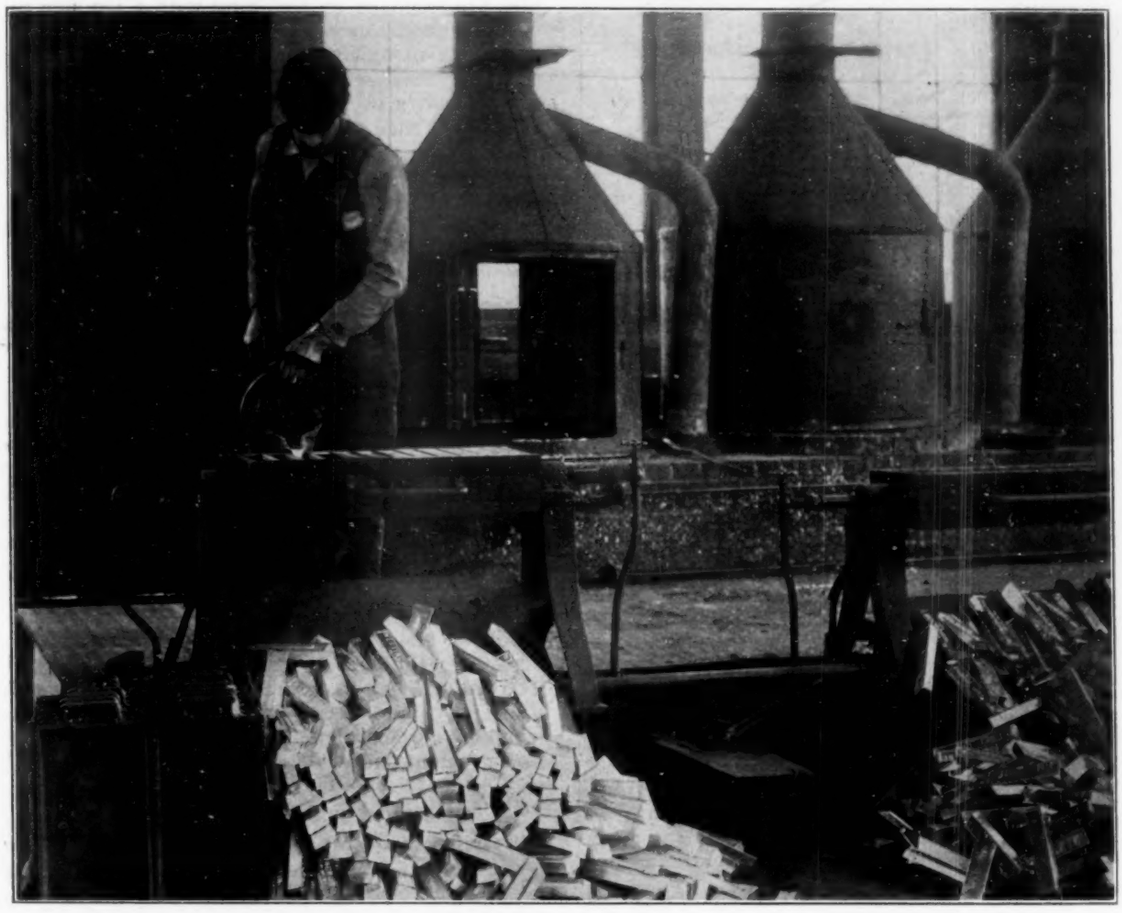


FIG. 1. A BATTERY OF THREE 3,000-POUND GAS-FIRED BABBITT KETTLES AND TWO 12-GANG REVERSIBLE WATER-COOLED INGOT MOLDS.

The second is a lead-base babbitt that contains considerable tin, flows well and is much tougher and but slightly softer than the usual babbitts of the Magnolia class.

Some use is also made of the lead-antimony, a hard genuine babbitt, and other special formulas that customers may specify.

MAKING THE BABBITT.

In order to insure the best results in bearings, only the very best grades of copper, lead, tin and antimony are used in making the babbitt. The use of drossy dross and weigh the clean lead. The same brand of lead may be very clean at one time and drossy at another, and the melting loss in making babbitt from it will vary accordingly, as will also the anti-frictional qualities.

There is no real economy in using an "off grade" of tin running from 93 to 98 per cent. of tin, instead of Straits, as it is necessary to pay for the tin content at the market price of tin, and the lead content at the market price of lead, so that all you obtain gratis is a little iron, antimony, dross, etc., that will increase the melting loss and add nothing to the quality of the babbitt.

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The grade of antimony to be used in babbitt has been the subject of very extensive practical tests. It has been found that in some cases the better brands, having almost identical chemical analysis, give quite different results in the finished babbitt in regard to hardness. As antimony is used as a hardening agent, and as the total amount used in any babbitt is relatively small, the brand which has given the best practical results, although it is the highest priced antimony on the market, has been adopted.

No really adequate explanation has as yet been found to show why this particular brand gives better results than other brands of practically identical com-

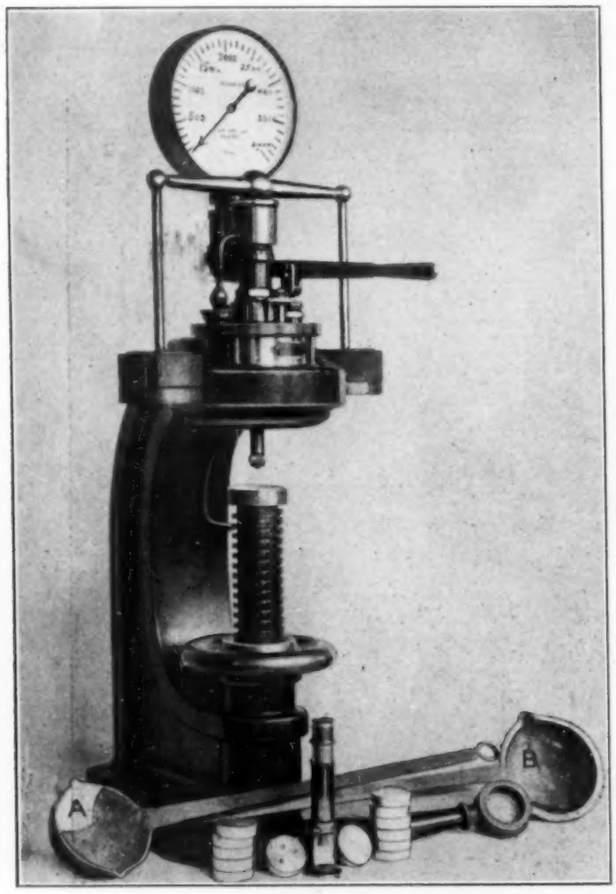


FIG. 2. BRINELL HARDNESS TESTING MACHINE, MICROSCOPE, MOLDS, AND LADLES.

position, but this fact has been checked so often that it is now accepted without question.

Having secured the best materials obtainable they are melted together in the proper proportions to produce the grade of babbitt desired. It is customary in making a genuine babbitt to combine the copper and antimony, or the copper, antimony and part of the tin to form a preliminary alloy or hardener. This is mixed with the rest of the tin, thus giving a more uniform product.

A temperature of about 900 degs. F. should be used in mixing a babbitt to secure satisfactory alloying, and the surface of the metal should be protected from oxidization by a layer of powdered charcoal. Dross is removed by boiling up with green hickory wood, and the babbitt may be deoxidized by means of vanadium, manganese, aluminum, magnesium, sodium, etc. When all new metals are used deoxidization is as a rule unnecessary.

POURING THE INGOTS.

Before pouring into ingots the temperature of the babbitt should be lowered considerably, especially if water-cooled molds are not used, as a finer grain is thus secured.

For pouring the ingots a bucket-shaped ladle with a bail and handle and a long, square-nosed pouring spout should be used. It gives a good surface as the metal is less agitated in the pouring than when the ordinary ladle is used. A few ounces of the babbitt should first be poured into the mold, the stream interrupted for a second and then the pouring of the ingot completed. A cushion for the stream is thus formed and the surface is smoother as a result. Small air bubbles are removed by touching with a wooden pick before the metal solidifies.

Taking so much pains to obtain ingots of good appearance may seem unnecessary when the babbitt is for one's own use, but it has been found that the nicer the appearance of the ingots, the better the bearings turned out, as the workman babbitting the bearings will take more pains with his work than when rough-looking ingots are given him.

A battery of three 3,000-lb. gas-fired babbitt kettles and two 12-gang reversible water-cooled ingot molds is shown in Fig. 1.

The Brinell hardness test has been found satisfactory as a shop test for securing uniformity in the babbitt. Tests are taken from the top, middle, and bottom of each 3,000-lb. kettle of the ingot metal and similar control tests are made daily on each of the various babbitt pots throughout the works where the bearings are filled.

Bending, fluidity and peening tests are made daily on strips 12 x ¼ x ¼ in. Analysis, tensile, compression and specific-gravity tests are also made occasionally, while a babbitt inspector, who is a thoroughly practical man, has general supervision of all babbitt pots and the pouring of all bearings.

The Brinell hardness testing machine, the mold for hardness tests, the microscope for reading the hardness tests, the pouring ladles, etc., are shown in Fig. 2. The ladle *B* in this figure has proved very satisfactory in preventing waste of babbitt by splashing. It has an iron rim, oxyacetylene welded, that prevents splashing in a great measure. A patent has been applied for on this device.

BEARING SHELLS AND THEIR PREPARATION.

Bearing shells for stationary apparatus are usually made from cast iron, because of its rigidity and cheapness. Where mechanical strength, a certain amount of toughness and cheapness are desired, malleable iron is used.

Shells of cast steel are made for some customers but they are not recommended, as the steel is too springy. It is not uncommon for a steel shell to be machined, ready for babbitting and then remain in the shop for a few weeks. When examined it may be found to be badly warped due to the casting strains being relieved. Warping is very likely to occur also on rebabbitting.

For street cars, etc., standard phosphor-bronze shells are used, because with such a bearing the return of a car to the barn is assured even if the babbitt melts and runs from the bearing. A novel bearing used by one street car company is a solid shell of A1 babbitt weighing 23 lbs.

To prevent the babbitt lining from flowing, due to

the revolution of the axle, all iron bearings are provided with cast anchor holes or "buttons." These are made by adding to the green-sand core of the casting, baked anchor cores, secured with brads as shown in Fig. 3.

There are two sizes of anchors used, ½ and ¼ in. as shown in Fig. 4. Where bearings are bored before babbitting the cores are made of such length that the holes will be standard after boring. To help the molder in setting the cores, the pattern maker "spots"

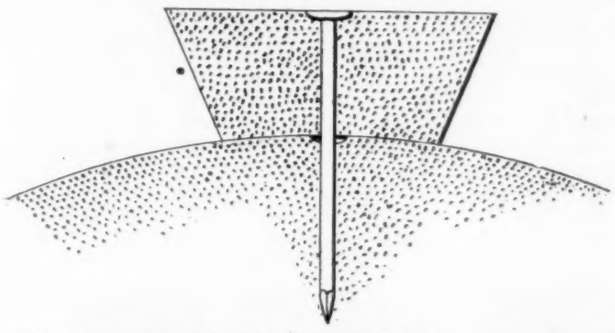


FIG. 3. BAKED ANCHOR CORE FOR PRODUCING ANCHOR HOLE IN BEARING.

the pattern so that it will leave small center marks on the green-sand core. Along the straight lips of each half bearing, the anchor holes should be very numerous and as close to the edge as is possible in casting.

With bronze shells, undercut grooves or anchor holes, drilled in diagonally, may be added to prevent the lining loosening in case the bearing has been poorly tinned, but if properly tinned and babbitted, these are unnecessary. The greater the amount of babbitt in the anchor holes of a bronze bearing the greater will be the shrinkage and the more likely the lining will be to be loose and spongy.

A bearing with large anchor holes seldom gives a clear, bell-like sound when struck with a hammer. But if the anchor holes are few and small, the bearing properly tinned and poured with a thin lining, the babbitt becomes an integral part of the bearing, can only be stripped off with great difficulty and leaves a "white frost" on the bronze.

Iron bearings are cleaned in the tumbling barrel, or by the sand blast at the foundry. It is usually necessary to clean out the anchor holes by hand before babbitting, or even to pickle in hydrofluoric acid (especially on bearings provided with oil-ring lubrication), because any adherent sand will be loosened by the hammering necessary in adjusting the mandrel, and this sand mingling with the babbitt when poured will ruin the bearing.

A bearing that was refilled three times and ran hot each time was finally examined with a microscope and black grains of sand were found embedded in the babbitt. After cleaning the shell with hydrofluoric acid and babbitting a fourth time no further trouble was had.

Rough boring all bearings before babbitting is desirable, as it gives a lining of the babbitt of uniform thickness, a uniform grain and hence a uniform rate of wear.

All iron shells are heated before babbitting to a temperature that will just admit handling them, say 350 degs. F. This heating is done preferably in an oven, but it may be done over a coke or gas fire. In the latter case, especially with bronze bearings, the inner surface that is to be babbitted must be turned upward, otherwise a greasy deposit will form on the bearing that will prevent a good job of tinning, and hence the proper adherence of the babbitt.

The tinning of bronze shells is best done by immersing them in a pot of molten solder of "half and half" composition, using a saturated solution of zinc chloride as a flux, applied with a mop of clean woolen waste. Immediately after tinning, the bearing is placed on the mandrel and babbitted. Unless there is a clean film of molten solder over the entire surface to be babbitted there will not be a perfect adherence of the layer of babbitt.

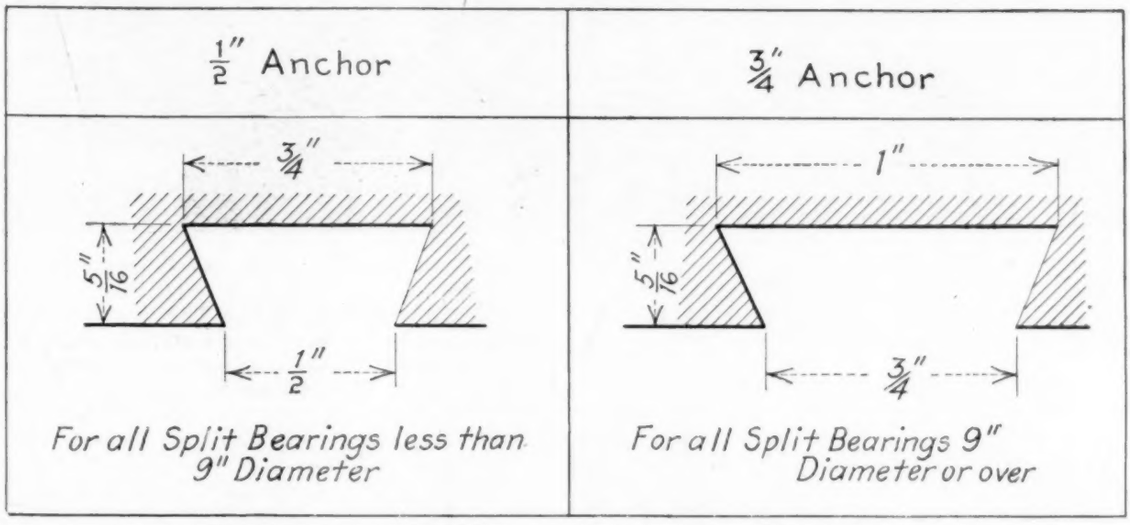


FIG. 4. SHOWING TYPES OF ANCHORS USED TO HOLD BABBITT FROM FLOWING IN BEARINGS.

This will also be true if babbitt has been used for the tinning, as the babbitt has a much higher melting point than the solder, and maintaining a clear molten film with it is difficult. The presence of arsenic in the babbitt, due to the use of cheap antimony, or antimonial lead, will result in loose linings also.

In order to avoid blow-holes and imperfections in the babbitt lining, it is very necessary to coat all mandrels with a very thin coating of clay wash. Put a pound or

two of Jersey red clay in a pail of water and stir until suspended, then plunge the heated mandrel into it. The mandrel will soon dry and the molten babbitt will "lie" on it, giving a smooth surface, free from bubbles.

This makes it possible to line a bearing with as little as 1-16 in. of babbitt and the surface will be so smooth that only 0.008 to 0.010 in. need be machined out for the finish. Brass shells from 1½ to 4¾ in. in diameter are usually lined with 3-32 in. of babbitt and 0.014 to 0.016 in. machined out. Iron shells are lined with ¼ in. babbitt and 1-16 in. machined out.

The use of the clay is especially necessary where oil gets on the mandrels. The oil causes the babbitt to blister. Half an hour's babbitting will not suffice to burn off the oil, but if the clay wash is used the oil is covered up and smooth bearings result.

Cast-iron shells are rarely if ever tinned, as such tinning cannot be depended upon to hold the lining in place. If the shells are made hot enough for the solder to alloy with the iron, the solder will oxidize and will not adhere. If kept cool enough not to burn the solder, the solder will fail to alloy with the iron, and hence will peel off when cool.

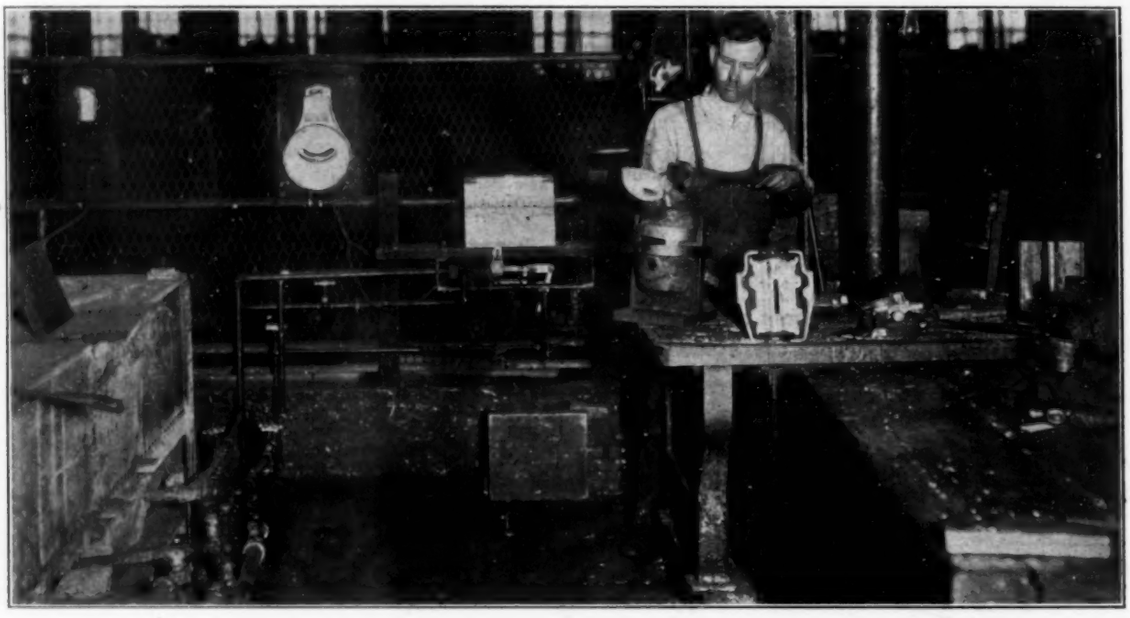


FIG. 5. SHOWING THERMOSTATIC APPARATUS FOR REGULATING FLOW OF GAS AND A VIEW OF POURING A BEARING.

POURING OF THE BEARINGS.

The babbitt is melted in cast-iron kettles holding about 500 lbs., and fired by gas. On first melting the new ingots, or in remelting the babbitt which has solidified after standing in the kettle, it will be found that the tin in the babbitt will commence to liquate at about 450 degs. F.; hence it is necessary for satisfactory work to heat the babbitt to about 850 degs. F. on starting up, and stir very thoroughly before pouring into the bearings, as otherwise the babbitt will not be of uniform composition.

After once thoroughly alloyed in this manner, there is comparatively little tendency for the tin to liquate, so long as the temperatures given as satisfactory pouring temperatures are maintained, although stirring of the babbitt during the pouring process is desirable.

The importance of the pouring operation may seem to be exaggerated in this statement, but if it leads the manufacturer to employ a skilled workman for pouring bearings, instead of a laborer, the slight exaggeration will be justified, for the skilled workman will not only pour the bearing properly, but he will also see to it that the quality of the babbitt, its temperature and the tinning are what they should be.

The temperature at which the babbitt is poured is important. If much above 900 degs. F. the shrinkage is very pronounced, and porous areas result, while the babbitt will be dirty and oxidized and its anti-frictional qualities injured. Uniformity of temperature is desirable, and this is maintained by the use of a delicate thermostat. The thermostat is set for 860 degs. F., and the gas is shut off when 880 degs. F. is reached, or if the temperature falls below 840 degs. F. more gas is turned on. Fig. 5 shows this apparatus and a general view of the operation of pouring a bearing.

The shape of the lips of the ladle used for pouring bearings is very important. The lips should not be sharp but rounded, so that the stream will not strike either mandrel or shell, otherwise a "burnt" streak will result. A broad stream or an intermittent stream will produce porous areas or masses of blow-holes. A good pourer will keep both elbows close to his body, use a hand leather, so that he can grasp the handle of the ladle near the bowl, and hold his body almost rigid while pouring, thus avoiding any surging of the metal in the ladle, or splashing.

If the pourer is not very skillful, a sheet-iron bridge, *A*, Fig. 2, may be riveted to the lip of the ladle so that it will extend some distance below the surface of the metal. It can be adjusted so that it will give a stream of the diameter found best for the bearing being poured. This will not only regulate the stream, but keep the dross out of the bearing, and thus prevent hard spots which cause the bearing to heat up when put in service. A pourer of long experience may not need such a device but it is a good thing for an

inexperienced man, as it prevents him from pouring too heavy a stream.

Bearings are preferably poured in a vertical position as this method gives the best results. Some half bearings are poured with the convex side upward, through holes cast in the shell for the purpose, the mandrel resting on a face-plate. Very large bearings are usually poured with the concave side upward. The ladle may be moved along the margin of the bearing when a large surface is to be poured and the lining is not very thick.

Jersey red clay and friction tape are useful in making tight joints at the bottom of the shell and mandrel, or for building up a dam at the top of the bearing, in case extra babbitt is needed to take care of the shrinkage.

FINISHING.

For cleaning the fins and surplus babbitt from a babbitted bearing, an ordinary "draw knife" such as is used by coopers will be found handy.

It is important, especially where a lead babbitt is used, not to handle the bearings roughly immediately after pouring. The babbitt is weak while hot and if the bearings are thrown upon the floor or given rough treatment, many of the anchors will be broken off and the lining loosened. The increased shrinkage due to pouring at too high a temperature will also cause the breaking off of the anchors.

All solid bearings are broached on a broaching machine, which is also used for pushing out the mandrel. The broaching operation makes the babbitt denser and harder and expands it into the anchor holes more tightly. This operation heats up the bearing, and the shell of a bearing of average size expands, so that it is necessary to allow it to reach the room temperature before making the finishing cut.

Where old bearings are rebabbitted, pressing them from the housing may make them under size, hence about 1-32 in. extra of babbitt is put in them and where broached the shell is expanded, a cut is taken from the outside and it again fits the housing accurately.

Oil grooves are cut in the finished bearings by hand, because as a rule the babbitt lining is too thin to permit their being cast. The grooves are cast in the lining when it is feasible to do so. This can be done satisfactorily, even with a very thin lining, by placing the bearing in a die-caster and babbitting it under pressure, but rough turning the bearing on the outside to a definite diameter is necessary for the die-casting operation.

The most important element in the production of a satisfactory bearing is the pouring. The quality of the babbitt is important, the use of a thermostat is important, the tinning is important, but more depends on the actual pouring of the lining than on any other one element.

COPPER AND ITS ALLOYS IN EARLY TIMES*

By William Gowland, Assoc. R. S. M., F. R. S.

(Continued from April.)

ROMAN COPPER SMELTING.

We find in Rome and the chief seats of the empire a further extension of the use of bronze, not only for statues and other objects of art, but for vessels of all kinds, furniture and other articles of domestic life. Of special importance is the invention of a new alloy, brass, which comes into use for the first time in Europe.

Among the varied remains which are representative of the Roman occupation of Britain, few are of greater interest to the metallurgist than the cakes of copper found in North Wales and Anglesea. A typical example of one of these cakes, now in the British Museum, is shown in Fig. 4. Its weight is 26 lbs. 12 ozs. Another, found near the old mines at Llandudno, is stamped with the words "Socio Roma," meaning "to my partner at Rome." These cakes afford us, in their form and character, unmistakable evidence of their history. They had been obtained by smelting sulphide ores, or ores containing sulphides, in low hearths, in which they had almost certainly been allowed to solidify before removal. According to Pliny, who seems in this matter to have had access to fairly trustworthy sources of information, the copper obtained by smelting was brittle and useless, and in order to obtain malleable metal from it, it was mixed with lead and melted several times, and the oftener the operation was repeated the better was the quality of the copper. This brief account of copper refining by a non-technical writer gives us an excellent *résumé* of the process as practised in Roman times. The operation was evidently conducted with free access of air, and the lead used would, by its oxidation, aid greatly in the removal of impurities from the copper. That the process was a fairly successful one is shown by the analyses below of some of the copper coins of the empire, although from the skill displayed by the Romans in other metallurgical work we might have expected better results:

The earliest Roman alloys which have come down to us are copper, lead, tin, alloys of the fifth century B. C. Their chief peculiarity is their very large content of lead, namely, from about 19 to 25 per cent., the tin being about 7 per cent. They were worthless for practical purposes, but formed the alloy of which the large coin of the republic—which weighed from 8 to 11 ozs.—the "As," was cast. One of these analyzed by Phillips consisted of:

Copper, per cent.	Tin, per cent.	Lead, per cent.	Iron, per cent.	Cobalt, per cent.	Nickel, per cent.	Sulphur, per cent.
69.69	7.16	21.82	0.47	0.57	Trace	Trace

These copper-lead-tin alloys continued in use as coinage alloys until 20 B. C., but from that date until two centuries later lead is seldom found in coins except as an accidental impurity.

	Copper per cent.	Tin per cent.	Lead, per cent.	Iron, per cent.	Nickel, per cent.	Arsenic, per cent.	Antimony, per cent.
Copper coins, Caligula, 37 to 41 A.D.	99.24	0.10	0.46	0.20	Trace	...	...
Copper coins, Vespasian, 60 to 79 A.D.	99.53	...	...	0.27	0.20	0.20	...
Copper coins, Vespasian, 60 to 79 A.D.	99.13	0.22	Trace	Trace	0.33	...	0.32

The large percentages of lead were undoubtedly added in these cases on account of the cheapness of the metal as compared with that of copper and tin.

The copper-tin-lead bronzes appear also to have been used by the Romans for engineering and industrial purposes. An interesting example of this is afforded by the

broken shaft of a water-wheel, which was found in the lower Roman workings of the north lode of the Rio Tinto mine. The water-wheel was probably built in the first century of our era, as coins of the time of Vespasian (70 to 81 A. D.) were found near it. The analysis which follows was made by Henry N. Thomson,* the metallurgist of the Washoe plant, Anaconda:

Copper, per cent.	Tin, per cent.	Lead, per cent.	Iron, per cent.	Arsenic, per cent.	Antimony.	Silver, oz. per ton.	Gold, oz. per ton.
77.3	9.2	10.5	1.1	0.5	Trace	10.2	0.2

The bronze used for statues by the Romans also always contains lead in considerable proportions, as much as 6 to

Fig. 4. ROMAN CAKE OF COPPER. FOUND AT AMLWCH, ANGLESEA. (BRITISH MUSEUM.)

12 per cent. being often present. In this they were doubtless influenced by Greek practice, the lead being added to the bronze to increase its fusibility and more especially its fluidity when molten, so that it might receive the sharpest possible impressions of the mold.

As it might be thought that the presence of 5 per cent. of lead in bronze would seriously diminish its tenacity, I therefore determined the tenacity of a copper-tin-lead bronze composed of copper, 88.0 per cent.; tin, 7.0 per cent.; lead, 5.0 per cent., and found that it was only 1 ton per square inch lower than that of a copper-tin alloy consisting of nine parts of copper and one part of tin. The large percentages which occur in some Roman statues must, however, have resulted in weakness and comparative brittleness.

I may point out here that the addition of lead to bronze was and is largely practised by the Japanese, not only for the reasons stated above, but also to enable the objects cast of the alloy to receive a rich brown patina when suitably treated; and in this connection it is worthy of note that Pliny states that by the addition of lead to Cyprian copper, the purple tint is produced that we see in the drapery of statues.

But few analyses have been made of Roman statues, notwithstanding the vast number now in the chief museums of Europe. Those mentioned in table below are characteristic.

The alloy used by the Romans for mirrors does not differ greatly from that in use in Europe for metallic mirrors in comparatively recent times, the percentage of tin ranging from 23 to 28 per cent., but lead is present in all from about 5 to 7 per cent.

COPPER-ZINC ALLOYS—THE BRASSES.

Zinc as a distinct metal was unknown in early times, in fact as late as the sixteenth century it was not known in Europe; but there are strong reasons for the belief that the Chinese were acquainted with it as metal at least several centuries earlier. It is occasionally but rarely present in the implements and weapons of the Bronze Age, and then only in small quantities as an accidental impurity, which has been derived from smelting copper ore containing it.

In somewhat later times it occurs in rings, armlets, and other personal ornaments found in the ancient burial mounds of Germany and Denmark, but these mounds are of post-Roman date, and the objects mentioned have really been made from Roman coins.

In Greek alloys zinc is never found as an intentional addition, but only as an impurity, about 1 to 2 per cent. or less; in fact, according to Gobel, all antique objects which contain zinc are not Greek; but this, in my opinion, is only true for those containing considerable proportions of the metal, and not for those with the small amounts just mentioned.

In Roman times it first appears in the coins of the Republic as an impurity; as an intentional addition, however, it only begins in the time of Augustus (20 B. C. to 14 A. D.), when brass was made for the first time in the world's history.

One of the earliest examples is a coin of 20 B. C., which contains 17.31 per cent. of zinc.

The Romans were the first makers of brass. Although they were unacquainted with the essential constituent zinc, yet they had discovered that by melting copper together with a certain ore (calamine), a yellow alloy of a more golden color than bronze could be obtained.

SOME ANALYSES OF ROMAN BRONZES.

	Copper. per cent.	Tin, per cent	Lead, per cent,	Iron, per cent.	Zinc, per cent.	Nickel, per cent.	Antimony, per cent.	
Colossal statue	78.33	10.77	10.24	0.14	...	0.52	...	Fellenberg.
Statuette	78.77	9.03	12.07	0.13	...	Trace	...	Bibra.
"	87.36	6.23	6.20	Trace	Trace	0.21	...	"
Apollo, Gallo-Roman, first century A.D.	80.70	6.44	9.97	Trace	Trace	...	...	Wingham.

It was first employed for coins which appear to have had a higher value than those of bronze, even up to the time of Diocletian (286 to 305 A. D.), when six parts of brass are said to have been worth eight parts of copper.

* Engineering and Mining Journal, August 22, 1908.

There is, too, a curious statement by Procopius in his *De Œdificiis* relating to its value in the fifth century A. D., in which he says that brass was then not very greatly inferior to silver.

The method employed by the Romans in making this alloy from copper and calamine was a very simple one.

It was conducted as follows: The calamine was ground and mixed in suitable proportions with charcoal and copper in granules or small fragments. This mixture was placed in a crucible, and was very carefully heated for some time to a temperature sufficient to reduce the zinc in the ore to the metallic state, but not to melt the copper. The zinc being volatile, its vapor permeated the fragments of copper, converting them into brass. The temperature was then raised, when the brass melted, and was poured out of the crucible into molds.

This Roman brass is therefore one of the most ductile of the whole series of brasses. It is, besides, identical in composition with Tournay's alloy (copper, 82.5 per cent.; zinc, 17.5 per cent.), which, on account of this property and its rich color, is used for the manufacture of all French jewelry made from thin sheets in imitation of gold. Hence the brass of which the rosettes are made is notably of the composition which is best fitted for making such ornaments, and is that which would be employed at the present day.

I have also examined the scales forming part of a suit of Roman scale armor dug up in the excavations of a Roman camp near Melrose, and found them to be of practically the same composition as the above.

The following analyses represent selected examples of Roman brass containing the maximum amounts of zinc:

ANALYSIS OF ROMAN BRASS.

Coins.	Copper, per cent.	Tin, per cent.	Zinc, per cent.	Lead, per cent.	Iron, per cent.	Antimony, per cent.	Arsenic, per cent.	Nickel, per cent.	
1. Augustus, 30 B. C. to 14 A. D.	87.05	0.72	11.80	Trace	0.43	Trace	Trace	Trace	Bibra.
2. Tiberius, 41 to 54 A. D.	72.20	...	27.70	...	...	...	...	...	Gobel.
3. Nero, 54 to 68 A. D.	77.44	0.30	21.50	Trace	0.32	0.20	...	0.24	Bibra.
4. Vespasian, 71 A. D.	81.97	...	18.68	0.14	0.12	...	...	...	Phillips.
5. Trajan, 98 to 107 A. D.	77.59	0.39	20.70	...	0.27	...	...	...	Tookey.
6. Sabina, wife of Hadrian, 100 to 137 A. D.	82.35	0.43	16.84	Trace	0.38	Trace	Trace	Trace	"
Other objects: Fibula found at Mayence	75.07	0.20	24.45	...	0.28	...	...	...	Fellenberg.
7. Armlet	82.01	1.79	15.30	0.80	Trace	Trace	...	0.10	Bibra.
8. Fibula	84.45	1.72	12.31	1.44	0.08	...	...	Trace	"
9. Needle, Ireland	84.27	2.36	14.70	...	...	...	...	...	Church.

This process was so effective that, until a comparatively recent period, all brass was made in Europe by the ancient process, and even until a few years before 1861 it was thus made at Pemberton's Works in Birmingham. It was called "calamine brass," and was generally believed to be superior in mechanical properties to brass made by using metallic zinc.

The survival of this ancient process affords a striking example of the conservatism characteristic of British metallurgy, as brass had been made in England by Emerson, using metallic zinc, in 1781. This, so far as I have been able to ascertain, was the first to be made in Europe by melting copper and zinc together.

In Roman alloys the percentage of zinc was very variable, ranging from about 11 to 28 per cent. For ornamental purposes and scale armor they had an excellent alloy, of which the following are examples. Several rosettes and studs which had formed the mounts of a casket were unearthed in the excavations at the Roman city of Silchester in 1900.

The rich, golden color of these rosettes and their extreme thinness was so remarkable that I made the following analysis of one of them and its central stud:

	Brass Rosette, per cent.	Brass Stud, per cent.
Copper	80.42	82.31
Zinc	18.77	17.11
Lead	0.09	0.08
Iron	0.62	0.45
Silver	Trace	Trace
Nickel and Cobalt	Nil	Nil
Tin	Nil	Nil
	99.90	99.95

Both the rosette and stud are of practically the same alloy. Now, of all the copper-zinc alloys, those which contain from 15 to 20 per cent. of zinc possess the greatest ductility.

The greater number of the Roman coins contained less zinc than any of the above, while No. 2 has the highest percentage in any analysis I can find. The chief use of brass by the Romans, apart from the various coinages, appears to have been for fibulæ and other personal ornaments and for decorative metal work, and for these, as we have already seen, they had invented a metal perfectly suitable both as to its workable qualities and its beauty.

FIG. 5. BRONZE MOLD AND CAST.

That they were the first inventors of brass is, I think, without doubt, as the alloy is not found in Greece or the Greek colonies or elsewhere until the time of the Roman Empire.

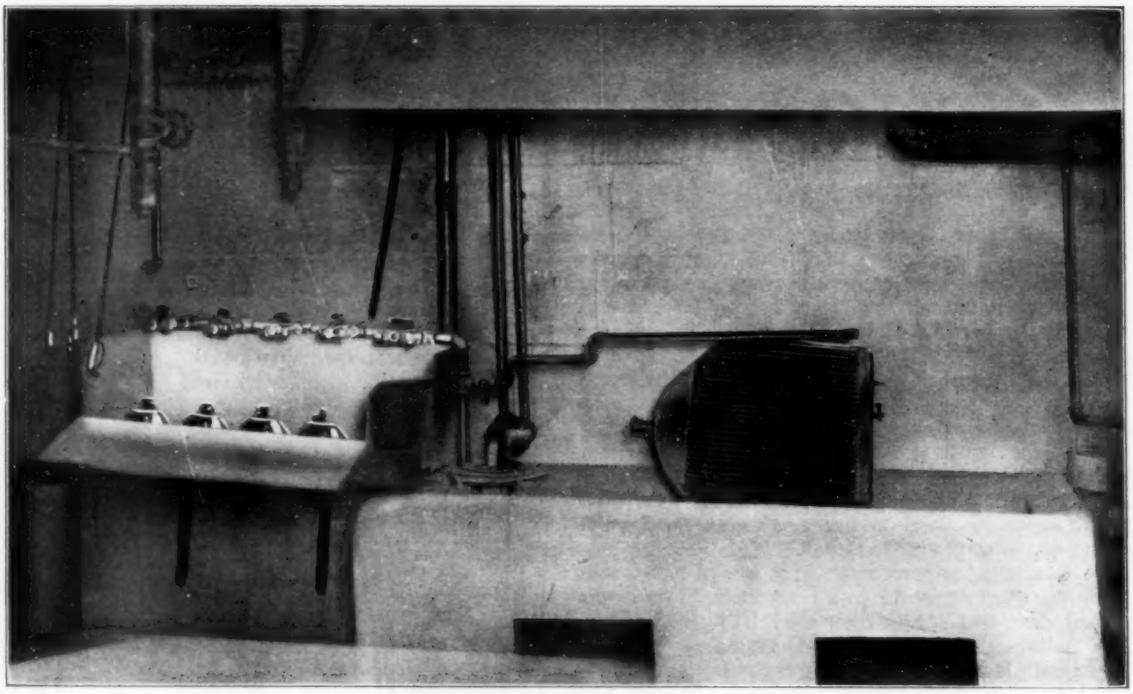
(To be continued.)

THE PRODUCTION OF PIGMENT GREENS

By Charles H. Proctor.

To produce pigment green finishes proceed as follows: The articles may be made of any metal, but should show considerable detail for contrast effect. If the articles are fairly smooth it is not necessary to polish them; a good scratch brushing will be sufficient. Cleanse the articles, as usual; copper plate them for from 20 to 30 minutes; oxidize with liver of sulphur to a steel color, and then wash and relieve the high lights with pumice to show the copper. The articles should now be dried and lacquered. The lacquer for this class of work should be French copal varnish cut with wood or denatured alcohol, and the thinner should be equal parts of fusel oil and amyl acetate. Equal parts of the varnish and thinner should be used, because a good heavy body is required. The lacquer may be applied by any of the regular methods, such as brush, dip or spray. After lacquering, dry by heat for 10 or 15 minutes. Now prepare a pigment green; this should be made up from 2 parts medium chrome green, 1 part of zinc white, and a small amount of ivory black; these are all dry colors. Mix up with turpentine to the consistency of thin paint; then add a small amount of turpentine copal varnish, or hard oil finish, a teaspoonful in ½ a pint or more of the mixed colors will be sufficient. When thoroughly mixed, apply to the lacquered surface with a soft flat brush; now dry the pigment surface for fifteen minutes or more, then allow to cool, and relieve the green very faintly from the copper that was previously relieved from the oxidize. Use a little turpentine with a few drops of linseed oil for the purpose; the tip of the finger and a piece of rag moistened with the turpentine and oil will be found the best method.

Now take a round sash brush, moisten the tip of it with linseed oil and turpentine mixed in equal parts and then rub in a little dry ivory black; very little must be used, and the brush must be rubbed out well; use a piece of paper or board for the purpose of rubbing out. Take the nearly dry brush and go over the green and copper relieved surface; by brushing rapidly the small amount of black will adhere to the green and give the proper shaded effect. Dry again, and then apply a very small amount of the lacquer, before mentioned, to the tip of a dry lacquer brush and go over the high lights of the whole article. This completes the operations, and gives the appearance of verde antique bronze. In the same manner any combination of colors can be applied to any base metal.



LYE KETTLE IN PLATING ROOM OF THE HYDRO CARBON COMPANY, MANUFACTURERS OF GASOLINE LAMPS, WICHITA, KANSAS.

The above picture shows a method devised by E. W. Heil, foreman plater, for cleaning the bowls of lamps before plating. A centrifugal pump is installed at one end of the kettle and is connected with sprays made by drilling holes in pipe crosses and plugging the three open ends. The sprays are placed over a pan which carries the lye back to the kettle. The five bowls, which the picture shows in the pan, are made of polished brass. The spraying machine will clean these bowls in one minute, taking the lye from near the bottom of the kettle and spraying it over the bowls, washing off the grease and composition left by buffing. The pipe which leads over the kettle is drilled full of holes for cleaning large pieces of work, such as auto radiators. This arrangement also increases the capacity of the lye kettle as work can be cleaned by the sprays while the kettle is full. Since this spraying machine was installed about three months ago, there has been no trouble with work peeling from being improperly cleaned or becoming tinned while in the lye and have plated as many as 280 bowls per day.

In mixing up and applying the pigment colors, it is desirable to make note of the following: If the color dries with luster or is tacky, too much turpentine copal varnish is added; if the color rubs off easily, not enough has been added. When properly applied the color will wear like the metal itself. The tones of the greens may be varied according to the proportions used. For these various tones, light medium and dark chrome greens should be used in combination with zinc white, chrome yellow, soluble blue and ivory black. The brown pigments, such as umber, sienna, vandyke brown, may be used to produce the old iron tones.

RAISING THE STANDARD OF QUALITY IN PLUMBING BRASS GOODS

By P. W. Blair.*

Manufacturers in the above line of goods are beginning to realize the quality value in their manufacture, and it has become one of the strong arguments from a selling standpoint and each piece of goods is stamped with the manufacturers' name or trademark, which makes the same easily recognized from the inferior or

FIG. 1. SHOWS COMPRESSION BIBB OF HIGH QUALITY.

cheap class of goods. They also unconditionally guarantee their goods, which compared with the cheap yellow brass goods that the market was flooded with a few years ago, and which they have about driven out of the field, is another illustration of where quality wins out. There is no question but that the line of goods placed on the market within the last ten years embracing plumbers' brass goods of high-class quality have come to stay, as they have practically driven the inferior low-priced yellow brass goods from the market. As an illustration take the manufacturers that are placing high-grade goods on the market at present and they prove to be the most successful in business. The

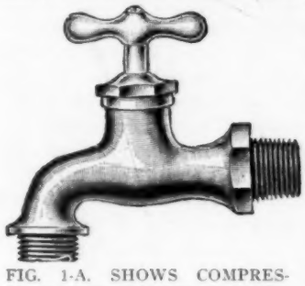


FIG. 1-A. SHOWS COMPRESSION BIBB OF LOW QUALITY.

FIG. 2. SHOWS FULLER BIBB OF HIGH QUALITY.

plumbers have been educated up to a standard of high-grade brass goods and the individuals who have them in use have caused the disappearance of the cheap shoddy goods that used to be on the market. The cuts herewith show the two classes of goods:

Any person with mechanical ability can discern the difference between the high and low ones by comparing the designs and exterior outlines, as the high grade goods are designed for strength, symmetrical proportions and convenience. The metal used in them is a special alloy of red brass having every element of strength and possessing excellent finishing qualities. Also one of the main features is the inspection of the different parts and rigid hydraulic test of 200 pounds which they are subjected to after they are assembled.

FIG. 2-A. SHOWS FULLER BIBB OF LOW QUALITY.

FIG. 3. SHOWS COMPRESSION SELF-CLOSING BIBB WITH ROLLER BEARINGS OF HIGH QUALITY.

FIG. 3-A. SHOWS SAME STYLE OF BIBB OF LOW QUALITY.

*Foreman, Brass Finishing Department, H. Mueller Manufacturing Company, Decatur, Ill.

FRENCH MINERAL STATISTICS.

[From United States Consul William H. Hunt, St. Etienne, France.]

The French Ministry of Public Works furnishes the following statistics of the world's production of the principal mineral substances in 1911:

Minerals.	Metric tons.
Coal	1,113,308,400
Iron	54,408,900
Petroleum	39,998,100
Salt	17,219,600
Lead	1,053,000
Copper	892,700
Zinc	856,000
Tin	116,000
Gold (fine)	*686,000
Silver	*6,343,000

*Kilos (kilo = 2.2 pounds).

The report says that the production of copper increased from 486,000 metric tons in 1900 to 856,650 metric tons in 1910, of which the United States produced more than one-half.

VARIOUS METHODS EMPLOYED IN JEWELRY DESIGN.

By Lawrence B. Robbins.

To design successfully one must know and understand the various methods used in designing, whether it be of badges, medals, silverware or whatnot. There is always at hand more than one way to surmount the many technical obstacles afforded by intricate designs and unless one knows a good part, if not all of them, he stands small chance of ever reaching the pinnacle of success in the designer's realm. Taking the designing of badges for example; let us try and imagine an order being received for the immediate delivery of designs. Say for instance three days are allotted in which to submit designs for a three-piece badge, and the party will not consider less than six sketches. That means, of course, an average of two sketches per day.

SAMPLE DESIGN FOR A BADGE.

Now it would not be deemed wise to set to work and try to draw up six finely executed water-color sketches in such a short space of time. Two perfectly finished drawings is a good enough stunt for any man, and in attempting to put forth more than that number in a day's time one would be liable to sacrifice his best ideas for execution. Of course if there was the promise of a large margin of profit in the order it would pay to work a little overtime and to one's best, but I am simply dealing with the average designer in the average instance. Now it stands to reason if the party ordering these goods wished for anything elaborate he would have given a great deal more time in which to gather ideas and execute them, provided he was endowed with the average amount of brains.

Suppose the order resulting from the acceptance of the sketches was to be, we will say, 10,000 badges. It is obvious that a cheap looking set of designs would be a dangerous proposition to submit and might ruin the chances of landing the order. And from the length of time allowed, to create a first class set of drawings would be practically impossible. This is one of the many times a designer must be able to choose his methods whereby he may turn out a sufficient number of drawings in the minimum space of time, and yet have them of more presentable merit. Therefore it is seen that the simplest methods are needed, which when used, though possibly not being capable of expressing the last word in carefully studied and beautiful design, will, nevertheless, convey the intended meaning in a straightforward manner, and thus stand a favorable chance of landing the desired order.

In a previous article I spoke briefly of the various ways designs might be effectively finished, viz.: wash and water color, pen and ink and pencil. While I mentioned pencil I do not advocate its use in finishing designs, unless it is intended to send them direct to the die cutters or tool makers. In that case it is all right, because they are simply returned to the office for future reference after the tools are made, and it does not matter whether they are soiled or not at that stage of the game. But pencil is so liable to smooch and rub even with the best of care that to send a design done in pencil to a prospective buyer is, in my opinion, rather risky. First impressions are those which count and a smoochy drawing would not furnish a good impression by any means. My faith is pinned to wash (or water color) and pen and ink. Where one cannot be used the other can or a combination of both, with sometimes a very little pencil worked in to heighten the effect.

But to return to the original topic, which method should the designer employ in the case presented? Water color, if one has the time, is the ideal way to finish designs, but, as stated before, it would take considerable more time than that allowed to properly finish six such sketches. Pen and ink would be suitable for a very quick sketch in which no color scheme was desired, so the best thing in this case would be the combination of the two; water color and pen and ink. In the illustration, while, of course, the colors are not reproduced, their relative values can be readily distinguished. In this sketch the color was put on in perfectly flat tones after being carefully drawn in pen and ink. I might state incidently, that as every designer knows, only waterproof ink should be used. When the color was dry the shading was finished with the pen and not the brush. Lettering and all should be done in ink, in fact every detail in the drawing. This makes a very effective and rapid way of making sketches where time is not allowed for A1 work. Plain pen and ink drawings are resorted to when color schemes are not desired and was effectively shown in the illustration which accompanied a previous article, entitled, "Essentials of Badge Design."

The tracing paper method was also mentioned in a

previous article in reference to laying out designs. This method is also used in a certain class of work where absolute accuracy and precision do not count. It is the general idea and color scheme which are desired rather than absolute truthfulness. Very thin tracing paper is pasted by its edges over the face of the pencil sketch so as to lay as flat as possible and close to the surface of the drawing. Then with a soft brush lay a *thin* wash of the desired color over those parts which need color, exactly as though you were painting upon the drawing itself. These colors must be opaque and of the best quality so to lay perfectly smooth. Touch up with a bit of pencil and the results when completed will be more than pleasing considering the time and labor evolved. To finish, cut out a mat the same size as your drawing and with about enough margin to cover the part of tracing paper which is pasted down, and paste over the completed sketch. There are undoubtedly many other methods of finishing designs but whatever they may be their elements remain the same, viz.: water color, ink and pencil, and the list of undersirables reduced to one which is pencil.

As a last word let me speak on arranging designs to submit to prospective customers. It is a good plan to mount them on some back-ground of a somewhat neutral color if possible. If you can, make a folder out of what is known as "programme paper," something of a dark-green or brown shade. If no folder can be procured paste a flap of tissue paper on the top edge of the mount letting it hang over the drawing, thereby protecting the surface. Use the best paper you can procure, the best ink, colors and brushes. Good, clean looking drawings cannot be made without them. I might also state that while some people use quite a lot of gold on their designs I do not think it bears out their intended meaning. Nine times out of ten it looks, to speak in slang, like a bum imitation, while the use of legitimate color to attain the same end is by far the most artistic.

GANG AND BENDING DIES

A Series of Articles Describing the Manufacture of Various Kinds of Dies—The First Article on Blanking Dies Appeared in March, and the Second on Piercing Dies in April, 1912.

By Easy Way.

GANG OR FOLLOW DIES.

Gang, tandem or follow dies are termed such when a blank is punched, together with all holes or other shapes it is necessary to have in the blank and produced without handling the blanks separately as would be necessary if they were blanked in one die and the holes pierced in another. This type die eliminates handling the material and an extra die. A very common type of gang die is shown in sketch, Fig. 1, that pierces the holes and cuts the blank from the sheet. With these dies the stock is fed from right to left. First the holes are pierced, then the stock is fed along to the gauge pin and when the punch descends, the pilots engage the pierced holes and govern the sheet; while the blank is punched and at the same time the two holes are pierced for the next blank to be cut. When starting a strip of material advance it until one-sixteenth inch of it reaches over the E space or opening and hold firmly against the set edge C. As the punch descends, the holes F and F are pierced, the end of the sheet is trimmed by punch A to length and rests against the gauge pin D, which should be located about one-sixty-fourth inch farther to the left than the proper location, then when the punch pilots engage the stock they draw the sheet to its proper location. The blanking punch should always be longer than the piercing punches by double the thickness of the material used for two reasons. First, that the pilots control the sheet before the piercing punches engage it, and second, that the blanking punch enters the die just before the piercing punches start to cut and this will steady them and prevent shearing of the die and punches.

The next type of gang die, shown in Fig. 2, has an addition to the previous one and an extra opening and a punch working into this which cuts away surplus stock or scrap from the material in case of work being punched from strips wider than is necessary to get out two punchings. This style die eliminates hand work with snips to cut and remove this scrap which has always been a costly and a tedious operation. By cutting away this surplus stock or scrap with the punch leaves the edge of the material straight and in condition to rest against the set edge or guide. Referring to the sketch, Fig. 2, A is the trimming die, and by this the punch cuts away the scrap, leaving the edge of the material straight. The construction of these dies, shown in the sketches, are suitable for any shape, round or irregular it may be

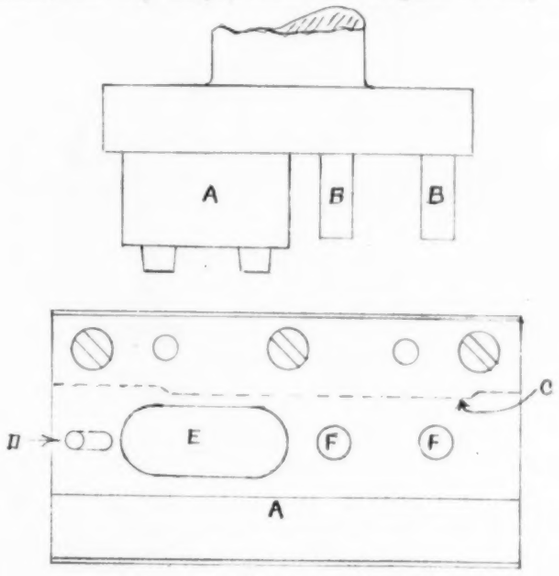


FIG. 1. GANG DIE-PLAIN TYPE.

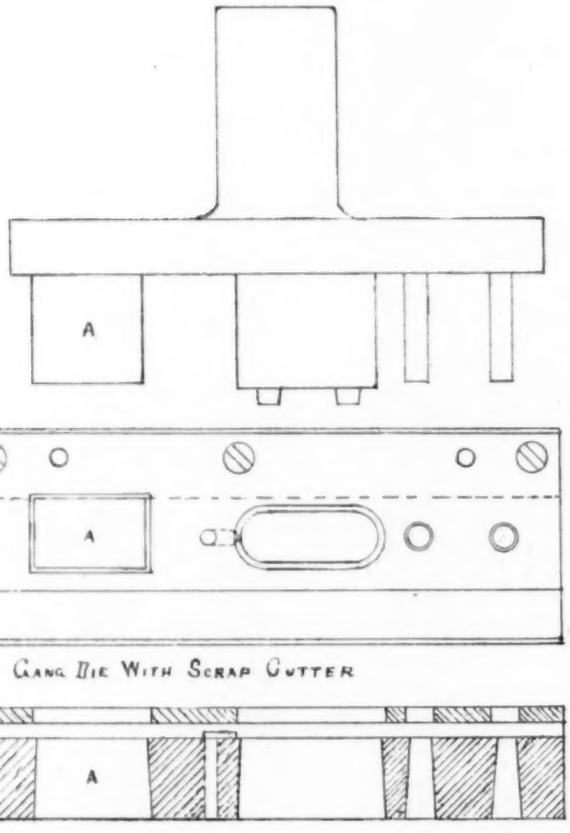
desired to cut, pierce and blank from strips or widths of sheet metal. And if in large enough quantities a roll feed can be applied to the press to feed the stock into the dies automatically.

BENDING DIES.

Bending dies are known as simple and compound in their construction and are made use of to form or bend sheet metal and wire rod in every conceivable shape. In order to do this they are used not only in the punch press, but in drop hammers and various other machines. When making bending dies for very soft metal their shape can be precisely the same as the templet or model or the shape required of the piece when finished. But if the material should be stiff and bend with difficulty, that is to

say, spring back after the blow of the die has been struck and not lie dead or set itself, it becomes necessary to make the die of a form that will give the pieces more bend than required. Again it is necessary when bending pieces of certain shapes to design the parts so that a certain portion of the piece will bend before the others. Therefore with like condition any attempt to make the tools solid would be a failure as it would be impossible to bend the various portions at once and the stock would be creased, cracked, stretched or ruined. There is a universal rule and standard not to stretch stock any more than is absolutely needed, because as soon as the stock has begun to stretch there is developed a strain which ends in rupture. A remedy for this is bending dies made in parts and constructed to help eliminate and do away with the trouble and is accomplished only by long experience and plenty of patience.

Many bending dies are controlled by spring cams or rubber pressure and also wedge pins to give the neces-



GANG DIE WITH SCRAP CUTTER

OUTLINE OF GANG OR FOLLOW DIE WITH SCRAP CUTTER ATTACHED.

sary amount of throw and travel with the proper velocity of force and all this must be timed exactly and made fool proof, because boys will be boys and all your energy may be wasted with one blow of the press. Should your design be not sufficiently strong to stand the thrust while performing its function the boy or operator would be compelled to try and hold it together and do his work at the same time. If he should forget, just one stroke, "that's all," and it's out of the door for you and into the scrap for all remembrances of you. A few simple bending dies are here shown, Fig. 3, which are self explanatory and of simple construction and can be made use of in everyday practice.

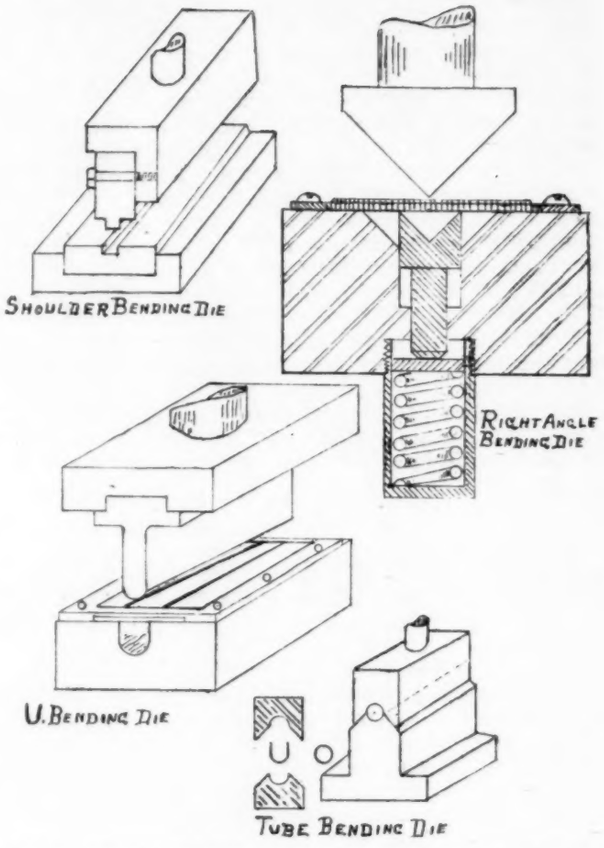


FIG. 3. DIFFERENT TYPES OF CORNER AND CIRCLE BENDING DIES.

SIAM'S IMPORTS OF CLOCKS AND WATCHES.

[FROM UNITED STATES VICE CONSUL CARL C. HANSEN, BANGKOK.]

According to the customs returns the value of Siam's imports of clocks and watches for the fiscal year ended March 31, 1911, was $38,025, as compared with $28,313 for the preceding year. Of these imports the United States supplied $2,355 and $1,217 worth, respectively. Switzerland leads in the shipment of timepieces to this kingdom, the Siamese import records crediting that country with $8,846 worth in 1911, Germany, Hongkong, and the United Kingdom following with $8,455, $6,139, and $5,102 worth.

No statistics are obtainable as to the number, kind, or quality of the imports of these goods, but the demand in general is for the cheaper grades of watches and clocks, the former retailing at $1 to $10 each and the latter from $1 to $12. Nearly every kind and grade of watches and clocks are sold in the Bangkok market, and there seems to be no demand for any special variety.

The total value of the jewelry imports into Siam for the same year amounted to $531,178, against $634,998 for the previous year. During this period, however, the United States failed to make any direct contribution to these imports, which consisted of gold, silver and plated jewelry to the amount of $148,522. These imports were for the greater part supplied by the United Kingdom and Germany. The import duty on all kinds of jewelry is three per cent. ad valorem.

POLISHING WHEELS, THEIR CONSTRUCTION, USE, CARE AND ABUSE

THE FOURTH PAPER OF A SERIES DESCRIBING THE VARIOUS TYPES OF POLISHING WHEELS.

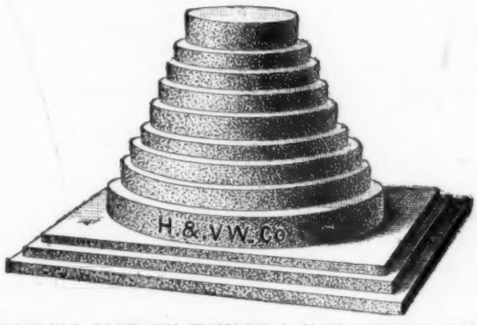
BY T. C. EICHSTAEDT.*

(Continued from November.)

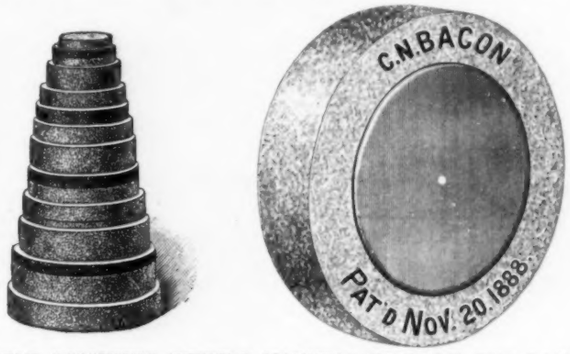
The claims which I made in the last installment of my article for the compress wheels are not a bit exaggerated; in truth, they are the best wheel made for the class of work that can be done on them. This is especially so of the leather compress wheels for sad-irons, where they are not using an automatic polishing machine on the flat surface or bottoms of the iron. They will last longer and do more work with one setting than any other make of wheel, if the directions for their care are followed out as described in the former article.

FELT WHEELS.

Felt wheels are more generally used in polishing than any other wheel known to the trade and make a good wheel for general purposes, although it is often used when some cheaper wheel would do the same work better and quicker. For instance, some shops use this wheel for roughing out and fining, and also for oiling. They should not be used for either roughing or fining but only for oil or finishing and buffing wheels, unless it be where the faces are cut into shape for certain odd-shaped articles. The felt wheel is a very handy wheel for such purposes as it can be turned down into shape in a very short time. It can be used for such work as knobs, hinge knuckles and butt tips, and beveled off for work that requires a beveled surface. The wheel never works well with a perfectly flat surface for flat work unless the flat surfaced article is narrower than the wheel, as the wheel will spread when pressure is applied to its face, consequently the work or article being polished will have streaks left on it from the edges not being worn down as finely as the center of the wheel.



FELT WHEELS SOLD BY HANSON & VAN WINKLE COMPANY, NEWARK, N. J.



FELT POLISHING WHEELS MANUFACTURED BY THE BACON FELT COMPANY, WINCHESTER, MASS.

The felt wheel makes a good buffing wheel on brass, nickel, copper and aluminum work where there is a background to the article that should not be buffed. While there are many grades of felt wheels made at the present time the best is commonly known as the Spanish felt wheel. The word Spanish does not necessarily mean that it is imported from Spain, although that is how the name originated. Spanish is the trade name applied to a certain grade of felt wheel about twenty years ago, and was then, and may be now, the best grade on the market, although there are many grades of Spanish wheels sold to day. The best way to order a felt wheel is to specify whether you wish a hard, medium or soft felt wheel and, of course, this is governed by the nature of the article you wish to polish. Brass work never should be finished on a felt wheel. This is permissible, however, in a job shop where it is impossible to keep wheels for every job that comes along. But in a manufacturing plant there should be certain wheels for certain jobs, just the same as there are certain tools for certain jobs in a machine shop and a place for all the different tools. A well-equiped polishing room in a manufacturing plant should have a place for their wheels and as much care taken of them as a tool room does of the tools for a machine shop. For flat work with a background use a hard wheel. No matter how hard it is when new the nature of the felt itself is resilient and one must not have the face of the wheel perfectly flat nor should it be too round. Should the work be of an oval nature a medium wheel should be used. A soft felt wheel is no good for any kind of work that I know of, and it is simply a waste of money to buy one as they do not hold emery and cannot be used where an irregular shape, such as grooves, are to be cut into, except with a great waste of time, felt, emery and glue. I know for I have tried it for over twenty-seven years.

When felt wheels were first being brought into use there was a brown and red and yellow felt, so soft that a common rag wheel is better now than they were, or than a soft felt wheel now is. I do not see why they should be made, but because they are made is no reason for using them. However, it is just the same with cheap tripoli, because in the first cost one-half, one-quarter or one-eighth of a cent can be saved and the purchasing agent falls for it. But he cannot be blamed for he does not know the difference and therefore it remains for the foreman of the polishing room to so make his requisition that the purchasing agent knows what quality is desired or required. Thus, it is more often the fault of the foreman rather than the purchasing agent when the polishing room does not get the grade of material required to do the work most economically. I know of no use for any felt wheel except the hard and medium grades Spanish felt wheel and these are white.

CARE, USE AND ABUSE OF FELT WHEELS.

First, be sure that your wheel is of the right size for the work to be polished. The hole for the spindle should be ⅛ in. smaller than the spindle where the spindle is 1¼ in. or over, and 1/16 in. smaller where the spindle is from ½ to 1 in., in order to secure a tight fit. The fit should always be kept tight and when the hole becomes large or loose it should be bushed either with

* Foreman Plater, Detroit, Michigan.

three strips of belt lacing, put through the hole and nailed on either end as close to the hole as possible, or a copper bushing made to fit the hole. One way to keep a tight fit is, instead of starting the lathe up and pulling the wheel off, to pull the belt so that you can back it off or screw it off the spindle. Similarly in putting the wheel on, start the machine only enough to run the wheel up to the flange, that is to say, have the machine run slowly so that it can be stopped when the wheel is run up to the flange. Another abuse is to let the spindle run with the wheel on it without a nut, or, in other words, the wheel is loose on the spindle. In revolving the wheel spreads or expands and the hole also becomes larger or lop-sided.

If the wheels are of a good grade they will be well dried out and almost a perfect balance when received from the supply house. If they are not they should be balanced.

Lead is a bad thing for a felt wheel and should be either screwed on or else a hole bored under the flange line and the lead inserted in the hole, or a patent wheel balance should be used. The writer can furnish anyone with a drawing of such a balancer which will act as a flange and balance the wheel without using lead and securing safety of lead flying off of any wheel and save time in hunting nails. It will also save wear and tear on wheels as pulling nails and lead off of the sides of wheels ruins them very quickly. At any rate a wheel of any kind must be balanced in order to run right and

FELT WHEELS MANUFACTURED BY THE BACON FELT COMPANY, WINCHESTER, MASS.

insure the quiet, smooth running of same. In order to get the felt wheel in shape put it on the machine—a slow running one if you have it. Try it running and if it does not shake the machine too much cut it down on the face with a freshly set-up buff stick, either No. 16 or No. 20 grit, or, if it shakes the machine too much, balance it before doing this, but you will have to balance it again after you have cut it down to run smooth on the face. This will have to be done a few times before you will have it true.

Many polishers use a chisel to cut them down, but a buff stick, properly handled, is better as it does not cut so fast and consequently does not waste as much felt. It requires a man of experience to perform this operation. The buff stick must be held with an even pressure, just catching the high part of the wheel every time it comes around until there is no more high part, and you have a perfectly round wheel running perfectly true. This sounds much easier than it really is. The idea is to hold the buff stick with just sufficient pressure to cut but no more, for if you use too much pressure you will not cut the high part out of the wheel but make it worse and will very likely burn the felt. This burning is a thing that must be avoided as it is very ruinous to the wheel, and cannot be detected until the lathe is stopped. The wheel burns in a peculiar manner; a blister forms wherever the pressure has been too hard and too long and sometimes a hole one-half inch deep under the blister is burned out. The softer a wheel is the more liable it is to be burned.

Burning may also happen while working the wheel, by using too hard a pressure so that the article being polished gets too hot by constant contact with the wheel. I do not approve of using a felt wheel for either rod or pipe as these articles cause more burns than any other class of work. Furthermore there are other classes of wheels better adapted for this kind of work. The wheel having been cut down so that it runs perfectly true and smooth, without chatter or rattle, is ready to be coated with glue, if it is wanted for a polishing wheel, or if wanted for a buffing wheel, it is ready for use by applying the necessary kind of buffing composition to the face of it. For cutting down brass, copper or aluminum tripoli is used; for nickel work, a white lime composition should be used. Care should be taken and good judgment is necessary in applying this in order to get the best results, as too much will clog the wheel and make it become gummy and the work dirty, while an insufficient amount of it will not give the desired cut to the wheel and waste the felt. I have seen two men work on the same machine and doing the same kind of work, and one would use up a wheel in a day and the other would hardly wear his down. If the wheel is set up in emery, put a coat of glue on the surface while it is on the spindle and start it. The superfluous glue will fly off. Then take a piece of pummice or sandpaper, using a light pressure and smooth down the glue, being careful not to cut through into the felt. Then take the wheel off; cut an arrow head into it to designate the direction in which it should be run. This can be ascertained before you put the wheel on in the first place by running your finger over the face of the wheel, and you will feel the nap of the felt. Run the wheel so that it runs with the nap, as running against it will turn the nap and so spoil the wheel. In order to clean off the emery for resetting, use the directions given for cleaning off compress felt wheels.

(To be continued.)

PRODUCTION OF GRAPHITE IN MEXICO.

[From United States Consul Alexander V. Dye, Nogales.]

The exportation of graphite from Mexico through the port of Nogales for the past three fiscal years ending June 30 was as follows:

Year.	Tons.	Value.
1909	1,773	$18,014
1910	2,620	28,828
1911	3,004	238,364
Total	7,397	$285,206

This was approximately the same grade of graphite each year. It is the product of several mines near La Colorado, Sonora, Mexico, which are owned and operated by an American company. The following information is taken from an engineer's report recently published by this company:

The graphite bed, as at present mined, reaches from 9 to 10 feet in thickness. It is extremely irregular in "strike," sharp curves coming closely together. Owing to the friability of the bed, almost no explosives are necessary, most of the mining being done with pick and shovel. The analysis of run-of-mine graphite is as follows:

	Per cent.
Carbon, all graphitic	86.75
Silica	7.60
Iron	.65
Alumina	5.00

THE ASSAY OF NICKEL PLATING SOLUTIONS

By G. Bernard Brook.*

(Continued from April.)

ELECTRO-CHEMICAL OR ELECTROLYTIC METHOD.

As its name implies, it is a process in which chemistry and electricity each have a part—it is, in fact, electro-plating on a small scale. Electro-chemical methods of analysis owe their development largely to the work of Dr. Mollwo Perkin, of the Borough Polytechnic Institute, London. This branch promises to become one of the most important and accurate means of determining the amount of metal present in solution.

Most industrial processes have their birth in the laboratory—yet, here we find the chemist adopting in miniature the electroplater's plant. Whereas the plater's vat has a capacity of several hundred gallons and his deposited metal weights pounds—a wineglass full of solution suffices the chemist and yields a deposite weighing but the fiftieth part of an ounce. The two processes are identical in principle, differing only in refinement, and in the fact that in the latter case the *whole* of the metal is plated out of the solution.

It is because of the striking similarity, combined with a considerable experience of plating solutions and their assay, that the author offers this process to the plater as an easy and accurate method for the assay of nickel (and other metallic) solutions.

Bearing in mind that the initial cost largely decides the acceptance of such methods in the case of smaller firms, whenever possible it is recommended that the apparatus shall be made by the plater himself. The chief expense would be the provision of a chemical balance and weights. A suitable one could be purchased for £3 and possibly much less secondhand. Its usefulness would not be confined to this particular process, but would enable the plater to assay the cyanide, potash, etc., purchased.

APPARATUS REQUIRED.

The two photographs will convey a comprehensive idea of the apparatus in use.

In Fig. 1, B is a wooden frame, base 12 x 6, with upright 5-in. pillars and crossbar.

T is a tile resting on B, round which a strip of copper 2 ins. wide is bent, terminating in a binding screw as shown.

D is a metal dish, resting on and making electrical contact with the strip of copper.

S is a spiral of wire, secured by binding screw b s on crossbar, adjustable as to height.

A and V are, respectively, ammeter and voltmeter, R a resistance frame and C the source of the current.

A Balance is also shown.

Fig. 11 shows the dish, spiral, etc., in detail.

The following, obtainable from any scientific instrument dealer, would be required:

(a) The Balance.—This should be sensitive to 1 milligram and the weights should run from 100 grammes down to 1/100 of a gramme.

(b) A 20-oz. bottle of concentrated hydrochloric acid, a 20 cc. pipette and a 10 cc. measuring cylinder. Ten ounces of rectified spirit.

The rest of the apparatus required is part of the electroplater's ordinary outfit or could easily be made in one or other of the departments of the firm.

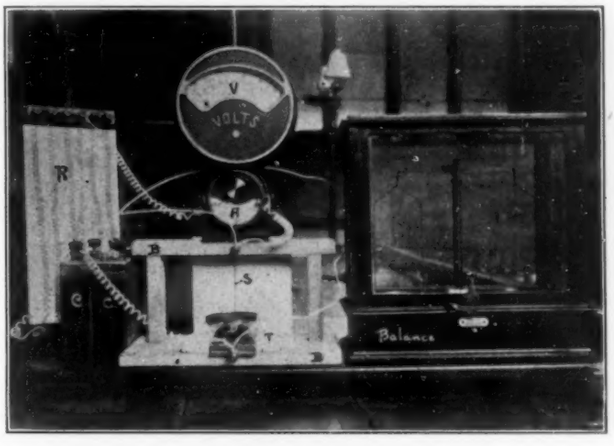
(c) The ammeter should register from 0-5 or 0-10 amperes and the voltmeter reading should be from 0-10 volts.

It is assumed that both these instruments would be in use in the plating shop and available for this special purpose.

(d) The resistance frame should be capable of reducing the current to .25 (¼) ampere. The reduction of the current might conveniently be effected by first passing it through a temporary vat, comprising a wooden bucket filled with, say, nickel solution or dilute sulphuric acid in which dip two strips of brass. Such an arrangement, used in series with the Resistance frame, would secure a small current well under control.

(e) The Source of the Current.—The current in most cases, using the resistances suggested in the previous paragraph, could be taken direct from the main leads from the plating dynamo.

(f) The Dish and Spiral Electrodes.—Herein lies the chief difficulty in recommending this process for workshop use. The dish and spiral used by the chemist are made of platinum, and the cost of the two would amount to at least £15. Unless a substitute for platinum could



APPARATUS REQUIRED FOR CARRYING OUT ASSAY OF PLATING SOLUTIONS.

be found, the process could never be applied to the plater's use. Experiments were therefore made with other metals.

It is essential that the metal chosen (1) shall not tarnish, (2) shall neither be corroded nor dissolved by the nickel solution, and (3) shall allow of the subsequent removal of the deposit without itself being acted upon by the acid used to dissolve the deposit.

Successful results were attained by using a heavily gilt silver dish.† The dish measured about 3 ins. across and 1 in. in depth, weighing less than 2 ozs., was burnished and plated with about 4 dwts. of gold. The spinning of this dish could be carried out in any electro-plating establishment.

While the author does not claim finality in the selection of the best material for the dish, the silver gilt one can be recommended with confidence. Many determinations have been made in the dish shown in the photograph, and

* Lecturer in Preparatory Non-Ferrous Metallurgy, University of Sheffield, England.

† The author begs to record his indebtedness to Mr. W. R. Barclay, Lecturer in Electro Metallurgy, Sheffield University, for his help in this matter.

with care it showed no appreciable difference in weight between one determination and the next.

The spiral was made of steel wire (about 17 B. W. G.).

GENERAL CONSIDERATIONS.

(1) The greatest care and cleanliness are essential.

(2) The dish, the inside of which receives the deposit, after cleaning, drying and weighing must not be finger-marked. The danger arising from traces of grease is even greater than in the plater's ordinary work.

(3) The process must be conducted in a corner of the workshop as free from dust as possible.

(4) The current should be under absolute control and continued without break until the whole of the metal is deposited out of the solution.

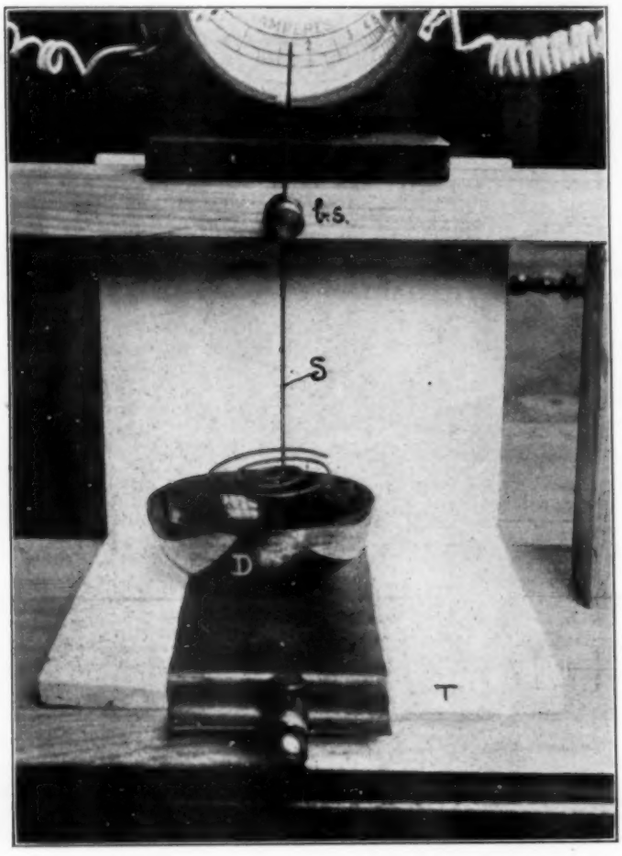


FIG. 2. SHOWING PLATINUM DISH, SPIRAL AND ELECTRICAL CONNECTIONS.

PREPARATION OF THE ELECTRODES.

(a) Place the spiral of steel wire in a cup or tumbler containing a little dilute vitriol (1:5). When the wire has become clean and white, fill up the vessel with water and allow the spiral to remain in the very dilute acid until it is required for the assay.

(b) Carefully rub the inside of the gilt dish with a little fine sand and a strong solution of washing soda. Rinse thoroughly and dry the outside on a clean handkerchief. Rinse the inside of the dish with a little of the rectified spirit and pour the rinsings into a clean, dry bottle, labeled "waste alcohol." This can be used several times for subsequent rinsings. The dish must now be dried thoroughly before weighing. This might easily be effected on the top shelf of an ordinary oven by resting the dish on a saucer (to prevent scratching the gold deposit). Heat for ten minutes, cool for five and weigh carefully on the balance.

Arrange all the connections correctly, remembering that the spiral corresponds to the anode and the dish to the article to be plated.

PREPARATION OF THE NICKEL SOLUTION FOR ELECTROLYSIS.

Take 20 cc. of the clear nickel plating solution to be tested, having previously rinsed out the pipette with the same; allow the 20 cc. to drain into a small beaker (or tumbler) and blow out the last few drops after half a minute. Add 20 cc. strong ammonia (.880). Pour the deep violet solution into the gilt dish, taking care that not a single drop is lost, and rinse out the last traces of nickel with several small quantities of water. This requires some care, as the final level of the liquid in the dish must not be less than ¼ in. from the top edge. Wash the spiral electrode with water, clamp it in the binding screw and allow it to dip about ¼ in. under the level of the solution in the dish.

THE DEPOSITION.

Switch on the current and adjust it so that the voltmeter reads 2.5-3.0 and the ammeter about 0.25 (¼).

A considerable amount of gas will be evolved, but this does not affect the adherence of the deposit.

Gradually the purple color fades. Continue the electrolysis for 20 minutes after all trace of blue color has disappeared. The strength of the current used varies, of course, with the size of the dish, and the time taken to complete the deposition with the nickel strength of the sample under examination. About two hours generally suffices.

The spiral is now removed, rinsed and dried.

The contents of the dish are poured out to be subsequently tested chemically, if desired, for traces of nickel. If the solution is quite colorless it may safely be assumed that the whole of the nickel has been deposited. Rinse the dish well with clean water, then with rectified spirit (alcohol) as before and dry for ten minutes in the oven.

Cool for ten minutes and weigh.

CALCULATION.

The gain in weight represents the metallic nickel in 20 cc. of the plating solution. This weight multiplied by 800 gives the ounces of nickel per 100 gallons.

Example:

Dish and nickel deposit	=	50.421 grammes.
Initial weight of dish only	=	50.123 "
Weight of nickel from 20 cc. solution	=	0.298 "

0.298 x 800 =238.4 ounces

i. e., the plating solution contains 238½ ozs. nickel per 100 gallons.

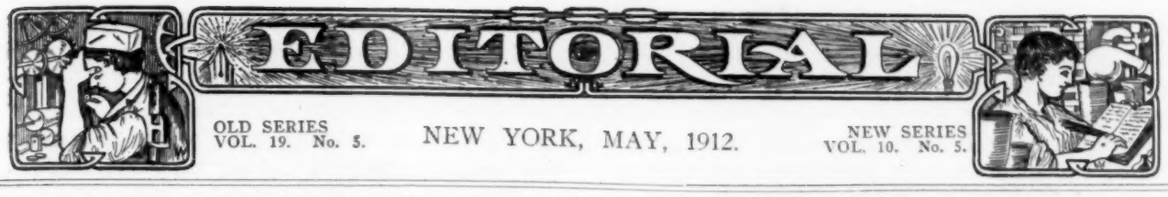
The color of the deposit will vary from light to dark gray—the color and the texture of the deposit are of no account provided it is firmly adherent. If the current has been too high the nickel will be powdery or strip off in flakes and, of course, would result in loss during the rinsing previous to drying.

REMOVING THE DEPOSIT.

The dish should be placed in a saucer, and filled above the line of the deposit with a hot mixture of equal parts concentrated hydrochloric acid and water. If necessary warm in the oven.

The nickel will be rapidly dissolved to a green solution. The gold will be unaffected. Rinse with clean water, then with alcohol as before; dry and wrap the dish up in cotton wool until it is required for a subsequent assay.

(To be continued.)



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THE METAL INDUSTRY

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THE ALUMINUM WORLD
THE BRASS FOUNDER AND FINISHER
THE ELECTRO-PLATERS' REVIEW, COPPER AND BRASS

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CONTENTS

SAFETY AND SPEED

When the news of the sinking of the gigantic White Star liner "Titanic" was flashed to the civilized world on Monday, April 15, it seemed unbelievable. With the accepted idea of exaggeration of first newspaper reports, people discounted the tale and waited for further details. Subsequent tidings only confirmed the first startling statements and rumors became facts with sickening promptness. When the verified reports were received from the survivors picked up by the Cunarder "Carpathia" it was learned that out of the grand total of 2,340 souls who sailed on the ill-fated ship only 705 remained to give more or less incoherent accounts of the tragedy.

What really happened among those who were entrusted with the navigation of this wonderful ship when she collided with an iceberg will probably never be known. An investigation now being carried on in New York and Washington by a Senatorial Committee, headed by Senator Smith of Michigan, is doing much to bring out what facts it is possible to get, but unfortunately there are none left to answer the question that first of all springs to one's mind: What was the motive that impelled the supreme authority on board to so disregard the safety of the lives of his passengers, to say nothing of the ship, to plunge through the water at twenty-five miles an hour when it was known that ice was in the vicinity? From the testimony given by survivors and from the reported attitude of those left on board, and who perished, we can only conclude that the disaster was due to an unreasonable desire for speed, to make a record for a maiden voyage and to an unbelievable amount of confidence in the stability of the "Titanic." To the fact that her officers, from Captain Smith down and including the passengers, believed the vessel to be unsinkable is due the loss of the ship and 1,635 lives. But for this confidence and the mad attempt to steer clear of the berg, when seen too late, the "Titanic" might be safely afloat today.

When the "Titanic" was built and launched she was heralded as the unsinkable ship. With watertight bulkheads, operated by electrical control, she was believed to be as stanch and safe as human power could make her. Undoubtedly she was, but man reckoned without the greatest peril of the sea, the iceberg. One glancing blow below the water line from the jagged contour of a floating mountain and the whole side of the ship was ripped open, the compartments rendered useless, and 2,300 people, enough to populate a small village, left exposed to the mercy of the sea. On account of her seeming security from the perils of the

deep, the "Titanic" was but partially equipped with lifeboats and rafts as a possible means of escape. From all accounts she had only twenty of these, calculated to carry at most 1,000 people, not quite half of those aboard and far less than her rated complement of passengers and crew of 3,000 souls. What she carried it seems, complied with the laws of the country in which she was built, but considerably less than is required by the laws of the United States. In this ship, as in many others, safety was sacrificed to luxury, and the space that would be taken up by extra boats, or enough to accommodate all on board, was utilized for recreation deck and provision for land sports, as tennis and golf! Good, it is said, is always born of disaster and this latest horror has proved no exception. Already the steamship companies have ordered their vessels to sail a course well out of the way of icebergs and ships are being equipped with boats enough to ensure the safety of all on board. Further, it is to be hoped that the insatiable demand for speed on the part of the traveling public will be so diminished as to be confined within safe and sane limits.

The loss of life accruing from this terrible catastrophe is appalling and gaps left in business and social circles will never be filled. The names of the martyrs to speed and luxury will long be treasured in the human mind, and we hope never forgotten. THE METAL INDUSTRY has, so far as known, only to record the death of two who were prominently connected with the metal world, Benjamin Guggenheim, president of the International Steam Pump Company, one of the famous family so long dominant in the copper mining and smelting industry, and Englehardt C. Ostby, of the well-known firm of Ostby & Barton, manufacturers of jewelry of Providence, R. I., a short notice of whom is given in the Personal column of this issue of THE METAL INDUSTRY.

The monetary loss is reported to be large. The hull of the giant ship alone was estimated to be worth in the neighborhood of four million dollars. The marvelous equipment of machinery involving the use of thousands of dollars of iron and steel, and aluminum, copper, brass and bronze alloys, will bring the total value of the ship well up to seven or eight million dollars. Descriptions of the metal work on these enormous ocean liners have been published several times in THE METAL INDUSTRY. Aside from the "Titanic" herself, there was carried a wealth of coin and jewelry belonging to the passengers, which, of course, are gone forever. All in all the wreck of the "Titanic" is the most appalling tragedy of the sea that has ever been recorded, and we sincerely hope that, as one of the results of the terrible lesson, sea travel will be made so safe as to prevent any possible repetition, even in a minor degree.

A few words should be said regarding the inestimable value to mankind of wireless telegraphy. Had it not been for this system of communication undoubtedly the loss of life would have been complete and none would have lived to tell the gruesome story. To Guglielmo Marconi, the inventor of this wonderful method of flashing news from one part of the globe to another, is due the heartfelt thanks of the entire world. Mr. Marconi should be given a world-wide testimonial *now* during his lifetime and *not* after his death. He should be allowed to receive the appreciation of his fellow creatures for his services to them while he still lives and can understand the meaning of such testimonial in his waking hours, irrespective of whatever form or substance it may take.

STANDARD SHEET SPECIFICATIONS

An impression seems to exist that the American Society for Testing Materials has adopted or is about to adopt a specification governing the sale and purchase of high brass sheet. This is not entirely correct. The sub-committee of general committee B2 on nonferrous alloys did prepare such a specification but at a meeting of the committee B2, held in New York, March 27, these specifications were discussed and, as reported in THE METAL INDUSTRY for April, were referred back to the sub-committee for revision as to the definition of temper, etc. As the matter now stands there is no specification covering high brass sheet engaging the attention of the Society for Testing Materials. It is expected that such a specification will come before it possibly in the fall but more probably at its next annual meeting in 1913.

NEW BOOKS

"ASSAYING AND METALLURGICAL ANALYSIS." By E. L. Rhead and A. H. Sexton. Second Edition, 1911. Size 6 by 9 inches; 450 pages with index; 105 illustrations; bound in green cloth. Published by Longmans, Green & Company, New York. For Sale by THE METAL INDUSTRY.

This work, which is the second edition, has been revised throughout and various additions of new methods have been made, which brings the book exactly up-to-date as a guide for all engaged in chemical and metallurgical work. The directions for work and the descriptions of processes have been made as concise as possible in order to reduce the size of the book. Care has been taken to make the methods of calculation clear, using for the most part the approximations of the atomic weights commonly employed. In a few instances, directions are given for the examination of work's products and solutions. The book is divided into three parts, of which Part I is devoted to laboratory appliances and general processes, useful hints rather than full descriptions being given.

In Part II the general plan followed has been to consider under the name of each metal (1) the materials and products in which its estimation is commonly required, giving a brief description of their characters, so as to make their identification easy; (2) the dry tests for, and important chemical reactions of the metal, with, in some cases, special instructions for the detection of small quantities; (3) the methods of conducting the dry assay by fusion or otherwise; followed by applications to special materials where modifications are necessary; (4) methods of dissolving substances and preparing the solutions for the determination of the metal; (5) methods for the gravimetric, volumetric and colorimetric determination, with the precautions necessary.

In Part III—metallurgical analysis—and attempt has been made to group the very various substances to be dealt with in a compact manner, and, by cross-references inserted in the text, to, as far as possible, avoid repetition.

CRITICISM AND COMMENT

WE CORDIALLY INVITE READERS' OPINIONS AND CRITICISMS OF ARTICLES PUBLISHED IN THE METAL INDUSTRY. SUGGESTIONS WELCOME.

TURRET LATHE PRACTICE

The January issue of THE METAL INDUSTRY contained an article by Ernest Dietz on Turret Lathe practice, which brought forth an interesting letter from a well-known English firm. As this letter contains some valuable suggestions we have published it below as well as Mr. Dietz's reply to it.

"MR. ERNEST DIETZ, care of THE METAL INDUSTRY:

"We have been interested in reading your article on 'A Few Suggestions on Turret Lathe Practice in the Manufacture of Brass Goods,' as we have for a considerable time now been experimenting with a view of avoiding reversing capstan lathes. We quite agree that there is a loss of time and a waste of power caused by stopping and reversing the machine twice for each threading operation, and also that there is decreased wear and tear of belt and countershaft, due to the fact that the machine does not have to be reversed. There is also the point that the driving band on the cone pulley on the head stock has to run the wrong way part of the time.

"We may say that we know of a case now where a firm is running near the capacity of the engine and they find that when they are working a capstan lathe, taking 2½-in. bar, that the engine slows down perceptably when this is reversed. The same firm some time ago had a shaft twisted off through the reversing of several lathes at the same moment. We have embodied the results of our experiments in a patented attachment for a capstan lathe which enables screwing or tapping down to the smallest sizes to be accomplished with the lathe running always in the same direction. We enclose a copy of the specifications from which you will see how this is accomplished. We may say that in the later ones we have made, we have modified the arrangement and are now driving with fast and loose pulley (the loose pulley running on a sleeve) placed at the right hand of the spindle, with a spring beyond them.

"We have also added a joint which enables the attachment to be swung back when the tool maker is setting the lathe, and it is fixed in position by the turn of a quick thread screw. We have had this now in use for some months in our factory and are about to put it on the market. We think that you will quite appreciate the advantages as any work, any size, can be done with this and the lathe is never reversed. Have you any knowledge as to the extra horsepower required to drive a lathe of given size and speed at the moment of reversal? If so, we should be obliged for the information. "PARTRIDGES LTD.,

"Birmingham, England. "By W. J. PARTRIDGE."

Mr. Dietz replied to the above as follows:

"The specifications describing your tapping and threading attachment have greatly interested me, particularly owing to the fact that some time ago I designed an attachment similar to those in use on automatics for use on hand operated screw machines. It differs from your device in the method of driving the tap and is entirely automatic. I quite agree with you as to the advantages of your attachment, particularly for tapping, as standard taps, down to the smallest diameters may be used. For external threading, however, I should prefer the self-opening die as the necessity for reversing is entirely avoided, and, what is more important there is no chance of spoiling the accuracy or finish of the completed thread by backing the die from it. I note from your letter that you are about to put an improvement of the device described in your specification on the market. I would appreciate it very much if you would favor me with some printed matter relating to it, at your convenience.

"Referring to your question as to the power consumption of a lathe at the moment of reversal, I beg to say that the only test I made with a view of obtaining definite information on this subject gave the following results: The lathe was a 15 in. Bardons & Oliver lathe, spindle speed at the time of reversal 705 r. p. m. Running normal the current consumption varied between 10 and 12 amperes. At the moment of reversal the current consumption varied from 18 to 26 amperes, according to the amount of time taken to throw over the shifter. Of course, you will realize that so many varying factors enter into this proposition that it is impossible to put down any accurate or reliable rule or formula for determining the power consumption at the moment of reversal except by making tests in each individual case."

New York, N. Y. E. J. DIETZ.

THE ELECTRIC CLEANING OF CASTINGS

AN ABSTRACT MADE BY C. P. KARR OF A PAPER UPON THE SUBJECT FROM A FOREIGN PUBLICATION.

When a current of electricity of the proper voltage and amperage is passed through an alkaline electrolyte, the castings suspended in such a bath, if properly insulated and connected up, are thoroughly cleaned from all oily particles or greasy matter. The bath may be hot or cold, the anodal current is introduced into the bath through an iron plate or a prism of carbon. The action is rapid and complete. The explanation of this action has heretofore been attributed to a chemical reaction, but it is now believed that this is not the sole cause of the changes effected. The chemical action is the result of saponification of the oily matter by the caustic alkali set free in nascent state and apparently explains the great energy of the reaction. If only oily matters were eliminated the theory would be almost indefensible, but it does not suffice to explain the elimination of machine oil, paraffin oil, paraffins and other unsaponifiable substances and within a period of time almost equal to that met with in saponifiable oils. These facts lead to the conclusion that something is due to the mechanical agitation of the electrolyte during the flow of the current.

In order to study this question the author has made a series of tests of a cleansing bath of the Brescit type, in which the electrolyte is formed of a solution of sodium carbonate, moderately concentrated, heated to a temperature of from 85 deg. to 100 deg. C. A plate uniformly coated with some tallow was completely cleansed in about two minutes. Afterwards the tallow was replaced by paraffin, the time required was greater, the bath kept hotter but the ultimate effect was the same. In a working bath containing saponifiable oily matter it is necessary that the temperature of the bath should be maintained at the melting point of the impure matter. The mechanical action is explained by the fact that the decomposition of the water formed at the cathode in an alkaline electrolyte is accompanied by the phenomenon of the explosive bubbles of hydrogen, thus generated. These minute bubbles in departing from the cathode carry away with them various particles of oily or greasy matter which invariably accompanied them, and naturally, this powerful phenomenon is produced when the oily bodies to be eliminated possess a certain plasticity or virtually when their temperature is equal to their melting point.

In regard to the electrolyte to be employed, the author remarks as follows: It is preferable to employ the salts of potash rather than the salts of soda; in the former, the development of the gas is more violent and there is less tendency to the formation of stains upon the castings, because the work is operated with stronger concentrations. To achieve this latter effect it suffices to add enough alkaline salt to operate effectively with a pressure of three to four volts (three kilograms per 100 litres of liquid is generally sufficient). The salts most suitable are the carbonates of sodium and potassium and the cyanide of potassium.

Shop Problems

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE OF THE METAL INDUSTRY. ADDRESS THE METAL INDUSTRY.

ALLOYING

Q.—Please advise us of the best alloy for lead composition pipes; also of a formula for hard lead pipes.

A.—The addition of three-quarters of one per cent. to five per cent. of zinc is said to greatly strengthen lead pipe. For a hard lead, six per cent. of antimony may be added and the alloy will still bend flat on itself without fracture. It is important with both of these mixtures that the zinc and antimony be thoroughly alloyed with the lead.—J. L. J.

Q.—Can you give us a mixture in bronze or brass, very tough, suitable for making a sparred frame, 1¼ inch parts, ⅜ by ⅛ inch? It receives a slight blow from a mallet when at about 250 degrees of heat, but we find it always breaks at the center.

A.—Manganese bronze is very little weaker at 250 degs. Fahr. than at room temperatures and on account of its great fluidity is especially suitable for casting thin sections.—J. L. J.

CEMENTING

Q.—Can you furnish formula that will unite brass and porcelain? Have been using powdered rosin melted, and same is not satisfactory.

A.—Use litharge and glycerine mixed to a paste form. Place same in the hollow part, press together tightly to exclude the air, and it will set solid in fifteen minutes, and will stand hot water or steam where rosin is not satisfactory and will not stand any hard wear.—P. W. B.

ELECTRICAL

Q.—Kindly inform me how large a dynamo I need for a five hundred gallon nickel or copper solution; also what voltage and amperage are required?

A.—For your purpose a dynamo of four volts pressure and three to four hundred ampere capacity should be ample, and still give you sufficient reserve energy for more tanks. It is always advisable to have a larger amperage than what is actually required to do the work.—C. H. P.

Q.—How can I make a battery for plating small metal goods?

A.—You can procure a battery for this purpose cheaper than you can make it. Write to firms advertising platers' supplies in The Metal Industry.

ELECTROTYPING

Q.—Will you please tell me through the Shop Problems what is the most suitable mixture for metal used for electrotyping purposes?

A.—The following mixture will furnish a good electrotype metal:

Lead	50	lbs.
Antimony	5	lbs.
Tin	2½	lbs.

This metal is quite fluid when melted and quite hard in the electrotype.—J. L. J.

FINISHING

Q.—Please tell me how to sandblast gold lockets and bracelets to obtain a lustrous matt finish.

A.—It is impossible to get as a lustrous satin finish upon metal surfaces by sandblasting as you would by a steel wire brush. If you wish to get a very fine matt upon the surface of your gold articles, use ground glass for blasting and afterwards brush the surface with a fine crimped brass wire scratch-brush. This operation may be either done wet or dry and may give you good results.—C. H. P.

FLUXING

Q.—I am alloying nickel with iron and tin, for anodes, and would like to know of a good flux that will help to remove gases and give a smooth surface to the castings. Lime purifies the nickel, but the castings contain pin holes, and if I use aluminum the castings are too dark in color. What I am trying to get is a solid casting, silver in color and free from blow holes.

A.—In making nickel anodes it is best to add the iron in the form of old files, as these are high in combined carbon and melt more easily for this reason. Use as a flux 3 parts of lime and 1 of fluorspar. After melting the nickel and old files together pour into ingots; then remelt, add the tin and pour into dry sands molds. French sand makes the best molds, as it contains considerable lime and dries very hard. The metal should be poured hot and the molds should be dry and hot.—J. L. J.

GALVANIZING

Q.—What is the best formula for a galvanizing bath for wire netting?

A.—For galvanizing by the molten metal process use any good grade of commercial spelter alloyed with aluminum, which acts as a flux and gives a smoother coating. Good results will be obtained by using 98 per cent. spelter and 2 per cent. aluminum.

For electro-galvanizing the following formula should give excellent results:

Water	1 gal.
Commercial Sulphate of Zinc	2 lbs.
" " " Alumina	2 ozs.
Common Salt	4 ozs.

The temperature of the bath should be from 70 to 80 degs., and it should be maintained neutral. Use anodes of 98 to 99 per cent. pure zinc, and 1 to 2 per cent. aluminum. The voltage required will be from ten to twelve, with amperage in proportion to the surface exposed to the tank. When the solution is prepared and the bath properly arranged with anodes, electrolyze the solution by hanging a few of the zinc anodes upon the cathode or work rod for a short time, or until a piece of work, when immersed for five to ten minutes, shows that the deposit is uniform and a good white color. To produce results upon a commercial scale the operations must be accomplished mechanically. First, the cleansing should be continuous, so a mechanical arrangement would be necessary. To take care of this operation the same arrangement should be placed in connection with the depositing bath, and the tanks should be of sufficient length so that a stated amount of time would elapse during the operation. Washing and drying could also be accomplished mechanically so that the process could be made continuous from start to finish.—C. H. P.

MELTING

Q.—Can you tell me what should be the average percentage loss in melting and casting a commercial aluminum alloy consisting of aluminum 88 per cent., copper 2 per cent., zinc 10 per cent? I should like to know:

First.—The percentage loss in weight of a mixture as above made from new metals.

Second.—The percentage loss in weight of alloy as above, including the average remelting of risers, etc., in an ordinary jobbing foundry.

A.—If crucibles are used for melting, a fair loss for the mixture you name would be 3 per cent. Using, say, 50 per cent.

new metal and 50 per cent. risers, etc., a loss of about 2½ per cent. could be expected. In making the new metal it is necessary to have it rather hot in order to alloy the aluminum, copper and zinc. Hence, the loss is greater than when a considerable amount of remelt is used.—J. L. J.

OXIDIZING

Q.—Can you give us a formula for oxidizing on top of nickel. We are now doing it on top of silver, but it seems to us that a white nickel ought to be just as well if it can be done.

A.—Nickel being a non-oxidizable metal, or rather not attacked by sulphur combination, it is impossible to produce an oxidized effect with the usual methods as liver of sulphur upon silver. If you wish to produce such an effect it will be necessary to copper the surface of the nickel lightly, then oxidize in a cold liver of sulphur solution, consisting of one-half ounce to the gallon of water, and add a small amount of ammonia. This will give a good oxidized effect when relieved in the usual manner.

It is possible to produce an oxidized effect by plating, which gives good results. The solution consists of a saturated solution of white arsenic in muriatic acid. Heat should be applied to the acid, and about two pounds of arsenic to the gallon will be absorbed. Now add an equal amount of water, to which is added about two to four ounces of sulphate of copper to each gallon. Mix the two solutions together and use anodes of copper. Use a weak current. This gives a good effect and will relieve easily and may answer your purpose. If the deposit is too bright, add more sulphate of copper until more of a smut is produced.—C. H. P.

PLATING

Q.—I am having trouble with my nickel-plating barrel. I always have it clean, but the work comes out dark instead of bright. Can you suggest a remedy.

A.—The probable cause of your troble is due to the use of too low a voltage. For barrel plating or other mechanical method, a voltage of from 8 to 10 should be used. If you are using less than this it proves that you do not create sufficient energy to do your work. The same results would be obtained upon a still tank if only 1 or 1½ volts were used instead of from 3 to 4. If you are using a sufficient voltage, then try adding more boracic acid to your solution. This can be increased up to 4 ounces to the gallon of solution. If this addition ought to be made, dissolve the acid in boiling water before adding to the solution.—C. H. P.

Q.—Will you kindly advise me as to the cheapest method of gold plating the inside of thimbles?

A.—The cheapest method would be the sponge method. This would avoid coating the outside of the thimbles with an asphaltum varnish or other resist to prevent deposition of the gold. The following method could be pursued: Prepare a frame to hold the thimbles in an upright position to hold a dozen if required. This frame could be of ring formation so the thimbles could set in, made from brass wire. The rings could be made sufficiently tight so that the dozen thimbles could be cleansed at the same time. The frame should be connected with the negative current. Connect two small strips of fine gold to a copper wire to connect with the positive current. A small piece of silk sponge (the small fine sponges of commerce), about the size of the inside of a thimble, should be connected to the strip of gold, being fastened with fine twine or thread, using care that the gold is completely covered to prevent short circuiting. A dozen sponges could be arranged in this way, so that the thimbles could be coated at the same time. It would only be necessary to moisten the sponge with the gold solution at each immersion in the thimbles, the length of deposit would have to be determined by observation.

The gold solution should consist of ammoniuret of gold, dissolved in cyanide of potassium and water, ½ ounce of gold and 1 ounce of cyanide to a quart of water would probably be about the proper proportion. Avoid using too much free cyanide. Ammoniuret of gold is prepared by precipitating chloride of gold with ammonia water using sufficient ammonia to precipitate the oxide in the form of brown powder; wash and filter. Use while moist, as ammoniuret of gold is highly explosive when dry.—C. H. P.

RECOVERING

Q.—Can we recover cyanide copper, cyanide brass, nickel and gun metal solutions that have been damaged by salt water by fire in the building?

A.—The operations of recovering the metals from the solutions you mention would be too expensive. It would be cheaper to make new ones. We would suggest that you filter them and try them out. Salt is used as a conducting salt for many baths, so we are of the opinion that you may still be able to use them. Build them up to the regular strength and then electrolyze them by hanging some of the anodes on the cathode or work rods for a few hours to bring back the proper action of the solution. You will then be able to determine whether they are still of any value.—C. H. P.

ROLLING

Q.—We understand in the States it is not unusual to roll 70/30 mixture hot, into sheets and bars. Can you tell us if it is necessary to use copper and zinc of any particular degree of purity, and what de-oxidizer is used if any?

A.—It is our understanding that there are no mills in this country rolling a 70 and 30 brass, and furthermore we are informed that it is not possible to do this practically. All of the good high brass mixtures, made with or without lead, are rolled cold in the United States.—K.

SPOTTING OUT

Q.—Will you kindly inform us through the Shop Problems how to overcome the spotting out of brass after being plated, especially in the sanded antique and statuary bronze finishes.

A.—As you have tried several methods and have not obtained the desired results, we suggest another one that has proved very successful with many platers. Dissolve in each gallon of water, 2 ounces of platers' compound. Then arrange a bath of sufficient size and use a steam coil of iron, so that the solution may be maintained at the boiling temperature. After the articles are finished in the usual manner, boil out in this solution for five to ten minutes; then immerse in cold water and then in boiling water, dry and lacquer.—C. H. P.

TINNING

Q.—In tinning knives, forks and spoons is there not a dip to harden the plate and hold the polish bright?

A.—It is impossible to harden tin by any method of dipping. If you wish to protect the bright surface the only coating to apply is a transparent lacquer, which may be obtained from lacquer advertisers in THE METAL INDUSTRY. In retinning spoons some firms use cocoanut oil on top of their tinning baths, and then dry out the spoons, after cooling, with a cheap flour. The thin film of grease remaining on the tin protects the finish against a slight oxidization.—C. H. P.

WELDING

Q.—Could you give us a formula for filed or granulated spelter which would flow easy and be suitable for German silver; also one for brass work of the same kind?

A.—You could probably use silver solder for your work, but it would be very expensive. A better plan would be to oxy-acetylene weld the parts, using German silver wire as the solder and borax as a flux. You can obtain an outfit for this purpose by corresponding with firms dealing in such supplies (names on file in this office). For a brass, try the following solder:

Copper	7 ozs.
Tin	1⅗ ozs.
Zinc	7 ozs.

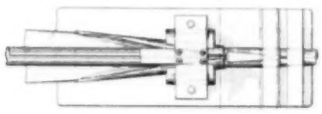
—J. L. J.

PATENTS

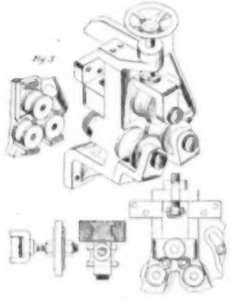
REVIEW OF CURRENT PATENTS OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

1,019,805. March 12, 1912. Tube Drawing Machine. R. Koenig, Brooklyn, N. Y., assignor to Phoenix Tube Company of the same place.

Invention relates to the manufacture of sheathed tubes, which are composed of an inner seamed tube of steel or iron, as shown in cut, and an outer seamed covering of metal such as brass, the inner tube contributing strength and the covering or sheathing giving the desired finish. Such tubes are made by forming bands of metal into split or seamed tubular shape, as shown in cut, and are usually brazed at the seam. The heretofore used method of making such sheathed tubes is that described in Skogse's United States Patent No. 617,363, dated January 10, 1899, and large quantities of sheathed tubing have been produced by this method, though it presents sundry defects which it is the object of my present invention to remedy. Chief among these defects, incidental to the Skogse method, are departure from true cylindrical form in the finished tube, and waste due to damage of the thin relatively delicate brass sheathing by roughness and irregularities of the inner steel core-tube. The rolling and shaping of the inner steel tube, by the Skogse method involves the application of rolling pressure from the unyielding rolls through the thin brass strip, and the inevitable occasional roughnesses and irregularities in the steel core bruise and tear the thin brass.



1,021,449. March 26, 1912. Pipe or Tube Bending Machine. J. F. Cox, Bayonne, N. J., assignor of one half to Mathew T. Cronin, of Bayonne, N. J.

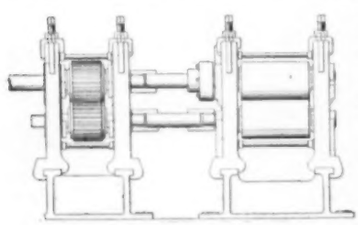


This invention relates to improvements in pipe bending machines generally and more especially that type for forming the pipe bends into coils. The claim of the inventor for the machine shown in cut is as follows:

A machine of the character described including a plurality of feed-rolls, a bending roll superposed with respect to said feed-rolls, a support for said rolls, having an arcuate slot, a screw-threaded member received by said slot and equipped upon opposite sides of said support with retaining nuts, said screw-threaded member being provided with a yoke carrying a pitch determining roll, the axis of which is arranged in a plane at right angles to the axes of the aforesaid rolls.

1,021,628. March 26, 1912. Rolling or Reducing Mill. W. G. Reeves, East Providence, R. I.

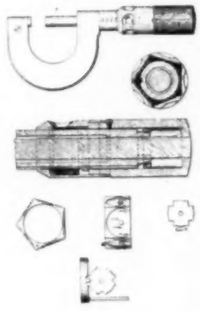
This invention relates to certain new and useful improvements in rolling or reducing mills and pertains more particularly to the driving means of the rolls. In rolling or reducing mills the bottom roll is usually the driven roll, the top roll being adjusted to give the desired thickness to the metal being rolled by means of screws, the top being frictionally driven. It frequently happens that the metal cramps the top roll while at the same time the bottom roll is revolved, resulting in an excess of heat which burns at flat place on the top roll. When this occurs the top roll has to be removed and a new one substituted therefor, and the old roll ground to remove the flat place.



The object of the invention is to provide means, shown in cut, whereby the above objection is obviated, the invention contemplating the intermittent driving of the top roll, in order to overcome the objection noted.

1,021,680. March 26, 1912. Micrometer-Calipers. F. O. Jaques, Cranston, R. I.

This invention has reference to an improvement in micrometer-calipers and more particularly to an improvement in the micrometer-caliper patented April 25, 1911, No. 990,665.

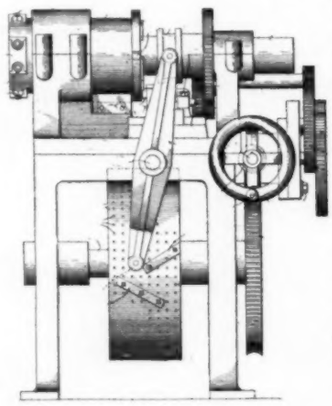


The object of the invention is to improve the construction of the said micrometer-caliper, whereby the indicating disks are pivotally secured in their operative positions independent of the thimble and the barrel, the openings in the thimble through which the numerals on the indicating disks are read, greatly enlarged, thereby eliminating shadows on the disks, the operation of assembling materially simplified, and the cost of construction greatly reduced.

The invention consists in the peculiar and novel construction of means, as shown in cut, for rotably securing the indicating disks, independent of the thimble or barrel and other details of construction in an easy reading micrometer-caliper.

1,022,086. April 2, 1912. Turret-Operating Mechanism. J. H. Jam, Chicago, Ill.

This invention relates to turret-operating mechanisms, as shown in cut, and adapted to be applied to metal-working machines in general, and particularly to screw-machines of the class comprising a tool-carrying turret adapted to reciprocate and carry the tools toward and from the chuck-spindle, and indexing mechanism for rotating the turret to bring the tools successively into alinement with the chuck-spindle.



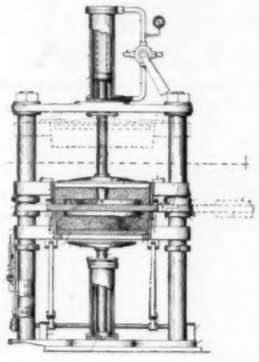
One feature of the invention consists in so constructing and arranging the indexing mechanism that the turret during its backward movement away from the stock will set in operation the turret rotating mechanism to bring the next filled socket into alinement with the chuck-spindle.

Another feature of the invention relates to improved means for controlling the indexing movements of the turret so that a constant angular speed of the turret will be maintained between each successive filled socket with no abatement at intermediate empty sockets.

A further feature of the invention resides in the employment of a safety device which prevents the operation of the turret rotating mechanism until the turret has assumed the proper predetermined longitudinal position.

1,021,938. April 2, 1912. MOLDING MACHINE. Hugh MacKay, Dallas, Texas.

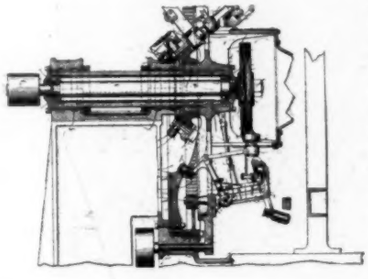
The object of the invention is to provide a machine, as shown in cut, having oppositely movable mold frames mounted above and below a laterally movable pattern support, each frame having its walls integral and without joints.



Among other features are the provision, of a molding plunger and a pressure cylinder for raising and lowering the same; a mold-raising plunger for raising the completed mold from the frame, and a pressure cylinder for operating said plunger; mechanism for raising and lowering the lower frame; means for fastening the upper frame against upward movement when the mold is removed; and devices arranged to connect the molding plunger and the upper frame when it is desired to raise the same or to be thrown out of operation when it is desired to raise the molding plunger and not the upper frame.

1,022,128. April 2, 1912. BUFFING MACHINE. E. R. Douglas, Glenside, Pa.

This invention consists of a novel construction of an automatic buffing machine, as shown in cut, especially adapted for the buffing or burnishing of metal caps or the like, although it will be understood that the invention is capable of general adaptation for the grinding, polishing, burnishing or buffing of irregular or grooved, cylindrical or other surfaces generally, the aim being to provide a mechanism of this character which is wholly automatic in its action and will smooth and polish all exterior portions of the article to be finished, each portion of said article being buffed to the desired extent to produce a finished article with an outer surface of uniform smoothness and polish, means being provided for presenting the article first to the coarser portion of the abrading wheel, and provision being made for lastly presenting the article to the finer or finishing abrading wheel, all the steps in the operation from the time the articles are fed into the machine until they are ejected from the chuck supporting the same, being entirely automatic and requiring no attention from the operator or attendant.



1,022,274. April 2, 1912. ETCHING FLUID FOR FLAT PRINTING-PLATES OF METAL. Otto C. Strecker, Eberstadt, near Darmstadt, Germany.

The etching fluid consists of a mixture of the following salts, which are preferably employed in the following proportions of mixture:

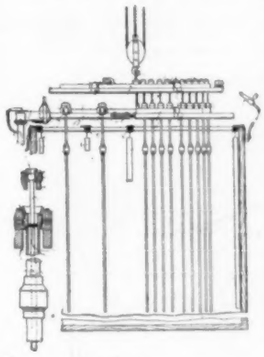
4	parts	of	fluo-silicate of aluminum.
12	"	"	" " " ammonium.
30	"	"	bi-phosphate of ammonium.
38	"	"	nitrate of ammonium.
14	"	"	nitrate of aluminum.

One kilogram of this mixture of salts is dissolved in 22 liters of cold water, to which 3 liters of thick liquid gum arabic is then added.

The exact proportionate quantities may be somewhat altered, without the action of the etching fluid being substantially affected. The bi-phosphate of ammonium may also be replaced by acid phosphate of aluminum. Instead of the ammonium salts the corresponding salts of sodium or potassium may also be used. They require, however, more water to dissolve them than the former, and are therefore less usable. To the chemical enumerated, 20 parts of acid chromate of ammonium or acid chromate of aluminum are added in many cases with advantage as oxidizing medium.

1,022,487. April 9, 1912. ELECTROPLATING APPARATUS. G. H. Lutz, Plainfield, N. J., assignor to American Circular Loom Company, Portland, Me.

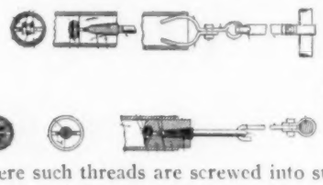
The object of the invention is to provide improved means adapted to permit simultaneous plating on the interior and exterior of hollow articles, such as pipes and conduits, and to enable a large number of such articles to be simultaneously and expeditiously plated.



In carrying out the invention there is provided a frame or spider, as shown in cut (adapted to be suspended over a suitable tank), having a series of hollow supports for articles to be plated, and another frame or spider adapted to be suspended over the first-named frame or spider, provided with means for supporting a series of anodes adapted to pass through the first-named hollow support and into the pipes or other articles hanging from said supports, means being provided to permit the anodes to have free passage into and from said hollow supports and the articles to be plated when the frame carrying the anodes is raised and lowered.

1,022,794. April 9, 1912. SUPPORT FOR ARTICLES TO BE ELECTROPLATED. G. H. Lutz, Plainfield, N. J., assignor to American Circular Loom Company, Portland, Me.

Where hollow articles, such as pipes or conduits for conductors in electric systems of distribution, are to be electroplated externally, it is desirable to electroplate the entire length thereof, including threads that are cut on the pipes or conduits near their ends, but where such threads are screwed into supporting sockets a portion at least of the threads will not be electroplated.

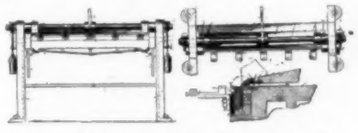


The object of the invention is to provide simple and convenient means, as shown in cut, for supporting pipes, conduits and the like in an electroplating tank by means entering such articles and held in engagement therewith by outward pressure, thereby leaving the entire exterior of such articles exposed to the electrolyte and electric current.

In carrying out the invention a support is provided with an expansible member adapted to fit within a hollow article to be plated, said member when expanded within such article gripping the latter in such manner as to support it.

1,023,049. April 9, 1912. MACHINE FOR MAKING LOCK-JOINED ANGULAR METAL TUBING. J. Standee, Brooklyn, N. Y.

This invention has reference to improvements in a machine for making lock-joined angular metal tubing to be used in ornamental bedsteads which are usually made of brass and iron. It is the special purpose of this invention to produce a machine, as shown in cut, for making angular tubing which is of simple construction, and although rather wide may be operated by one workman. Means are provided in the machine which render it adapted for the production of rectangular tubing of square and oblong cross section as well as tubing having other angles. Metallic tubing to be used in the manufacture of bedsteads must be smooth on the outside without any projection on the lock-joint. The present machine produces such tubing in a quick, reliable and inexpensive manner, and care has been taken to produce a strong and compact machine.



INDUSTRIAL

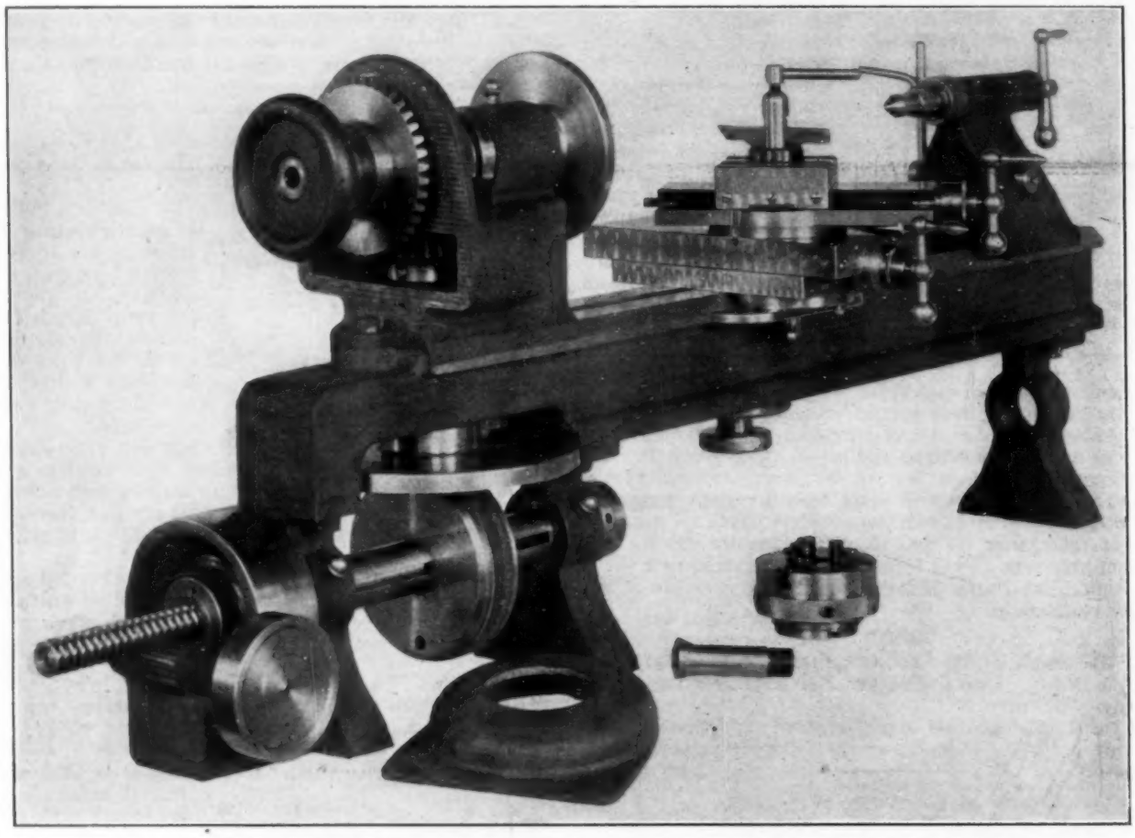
NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

PRECISION BENCH LATHE

The machine shown in the cut is a new 8-inch precision bench lathe, brought out by the Cincinnati Precision Lathe Company, Cincinnati, Ohio, and it is said by this company to differ from all other lathes of this class. It is friction driven, has single continuous speed pulley drive, eliminating cone pulleys, and thereby permitting of heavy and practically continuous spindle bearings of such rigidity as to obviate chatter under the heaviest cuts. There is an upward and a downward pull on the spindle, and the bearings receive uniform wear throughout, consequently they do not wear elliptically or out of alignment longitudinally.

The transmission of the bearings from the driven friction disc to the spindle of the lathe is by means of perfectly regulated miter gears, which run in oil and are connected respectively to the friction disc of the shaft and the spindle of the shaft. The working gears, with no back lash, so arranged that wear can be taken up when perceptible, insure smooth, positive transmission of power and an absence of chatter in the work from the heaviest to the lightest cuts. By means of a depression in center of friction disc the machine can be stopped almost instantaneously independent of the driving spindle. If desired, the entire friction disc can be champered at the outer edge, allowing the machine to come to rest at the center and outside of the disc. The disc, being driven, which is the reverse of most friction mechanisms, the highest power and slowest speed is obtained where desired, viz.: at the outer edge of the disc. By this arrangement, wonderful power, it is claimed, is obtained, thereby greatly widening the field of precision lathes and making possible the taking of heavy as well as light cuts, through the whole operation after work is in position, on one machine.

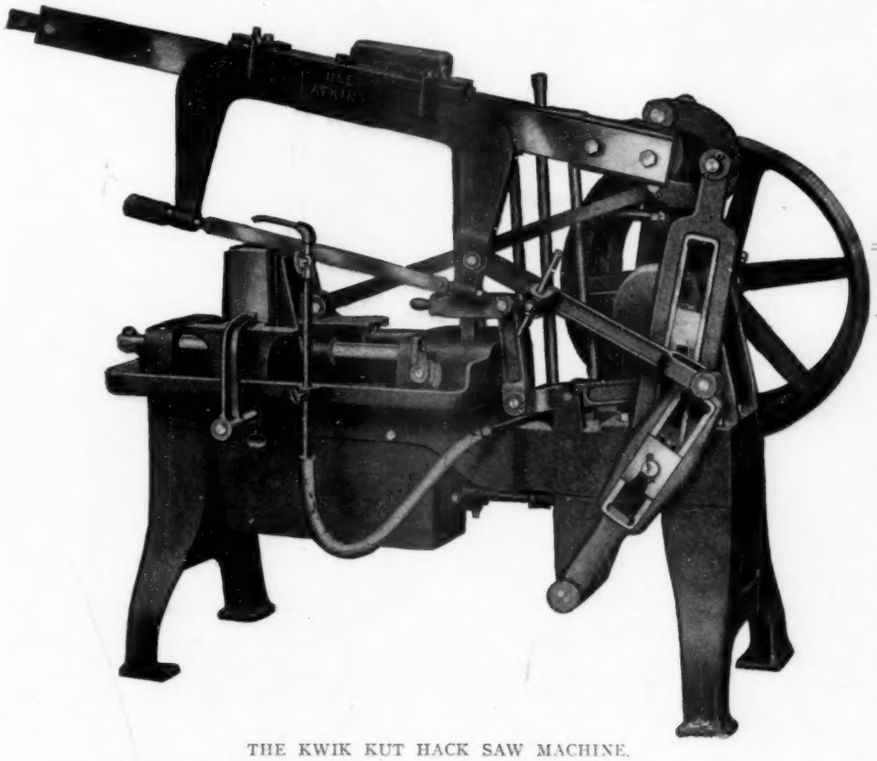
The elimination of complicated overhead countershafting and cross belting is effected by the means above described, and thus money and valuable ceiling space are saved. Also any number of machines may be driven from beneath the same bench, the single driving pulley being so arranged that the belt may be applied from upward or downward as desired. Centrifugal bushings are so arranged that the friction wheel and driving shaft may be quickly raised or lowered parallel to the friction disc, and therefore allow for the taking up of wear on the friction driving material. Some specifications for the construction of this lathe are published by the manufacturers as follows: The machine is constructed throughout of the very best of materials which can be procured. Castings of close iron properly seasoned after being roughed out before finishing. Hardened spindles ground and lapped. Bearings of highest grade of phosphor bronze. High-grade ball thrust collar bearings between friction disc and lathe bed. The friction material on the driving friction wheel consists of specially treated oak tanned leather compressed under high pressure, insuring excellent traction and durability of wear. The highest standard is observed in points of accuracy and workmanship, and the lathe is thoroughly guaranteed.



PRECISION BENCH LATHE MANUFACTURED BY THE CINCINNATI PRECISION LATHE COMPANY.

ATKINS KWIK KUT HACK SAW

The machine shown in the accompanying illustration is known as the "Atkins No. 7 Kwik Kut High-Speed Power Hack Saw Machine" and is manufactured by E. C. Atkins and Company, Inc., of Indianapolis, Ind. Among the claims made by the company regarding the special advantages of this machine are the following: It is the only machine employing the full stroke of the blade, automatically adjusted to the size of material in the vise. It also possesses other features such as quick return of the saw arm, draw cut, lifting of the blade on the return stroke,



THE KWIK KUT HACK SAW MACHINE.

etc. For these reasons it cuts faster and uses fewer blades than any other machine.

A patent automatic adjustment fits it to any size of stock which you wish to cut. The steel bar connecting the back vise jaw with the link hanger automatically changes the stroke of the saw frame to correspond with the dimensions of the stock.

This is the most important invention that has ever been made in connection with power hack saws, as it automatically insures the use of the entire length of the blade. The fact that we use the entire blade automatically on each stroke, as against a six-inch stroke, used in other machines, insures an actual saving of from 50 to 200 per cent. in cost of blades, and naturally increases the cutting efficiency and the life of the blade proportionately.

The No. 7 is a "draw cut" machine, or operates with a pulling instead of a pushing motion, which causes the blade to come in more direct contact with the stock, increasing efficiency.

Other additional features of this machine are: the accuracy of cut, due to the rigidity of the machine; the two-speed pulley, which enables it to be used on hard or soft material; a depth gauge and lubricating system. The company have also arranged to supply separate parts which may be required. The specifications for the No. 7 Kwik Kut are: Capacity, 8⅝ round or 8 x 8 inches; floor space, 20 x 42 inches; length of blade, 17 inches; size of pulley, 18 x 3 inches; 20 x 3 inches; weight, 410 pounds.

COMPOSITE METALS

The Hoyt Metal Company, manufacturers of white metal alloys, St. Louis, Mo., announce some improvements which they have recently made in composite sheet metals. These metals are made up by using aluminum as a base or core. By means of a rolling process aluminum is faced on both sides with pure block tin, soft lead, antimonial lead, and with alloys of tin and lead. These metals are given various names and certain claims are made for them as, for instance, alumin-tin or aluminum faced on both sides with pure block tin, it is said can be soldered and electro-plated readily and perfectly. The specific gravity is 3.34, and it is absolutely non-corrosive, stiff and strong, light and cheap as compared with copper, German silver and block tin. Alumin-tin weighs 38 per cent. with copper based as 100. Other forms of these composite metals are white copper stamping metal with a specific gravity of 5.10 which weighs 60 per cent. of brass. White-silver, which is Britannia metal having a core of aluminum, one-third the total thickness of the sheet, and weighs 29 per cent, of Britannia.

Further information regarding these metals may be obtained by corresponding with the Hoyt Metal Company.

IDEAL FURNACE PROGRESS

The Ideal Furnace Company, of Chester, Pa., announce that they are now building and will carry in stock Ideal furnaces of the following sizes, viz.:

No. 1 Furnace built to accommodate No. 225 to No. 275 Crucibles.

No. 2 Furnace built to accommodate No. 125 to No. 200 Crucibles.

No. 3 Furnace built to accommodate No. 80 to No. 125 Crucibles.

No. 4 Furnace (lift out type) to hold No. 50 to No. 80 Crucibles.

There has been no change in the construction of the Ideal furnace since the first furnace was placed on the market, the engineers of the firm believing that no change could be made that would tend to simplify the construction or cheapen the process of melting.

SAND BLAST MACHINE

Vogel & Schemmann, of Kabel, I. W., who opened a branch office in New York, N. Y., at the Hudson Terminal building, 50 Church street, have made a specialty for more than twenty years of building sand-blast machines of all sorts and for all purposes. They build sand-blast tumbling barrels, sand-blast machines with rotary table of different styles, sand-blast machines with siding tables of several types, etc. The machine of the type shown in cut is used for cleaning metal castings of all kinds and requires no hose. The nozzles can be adjusted while the machine is working. Bogel & Schemmann have taken special efforts to build the machine in such a way that the sand will be distributed evenly over the pieces to be cleaned, so that the effect of the sand-blast will be equally efficient in all parts of the machine. The machines work entirely automatically. The sand once used is brought to the nozzles again by a conveyer so that the sand is used over and over again. We are informed that the sand-blast machines of Vogel & Schemmann work absolutely dustless, so that they can be used in every shop without the necessity of providing a special room for the sand-blast machines.

SAND BLAST MACHINE.

ECONOMIES AND OPERATIONS OF DOUBLE DRAW PRESSES

Double draw presses are the latest development in improved means for producing cupped articles or shells by the drawing process. They differ mechanically from the ordinary double action press in having three instead of two moving slides, and in this comparison may therefore be called triple action presses. The primary object sought in the double draw press is to increase production or save time while reducing cost in manufacture by making two drawing operations on a single article with one stroke of the press, or to draw and redraw, or make two redraws in a single operation. It will be seen that this type is therefore particularly intended for articles that require more than one drawing operation to bring them to required dimensions. As a large percentage of all drawn work is in this class, the double draw press has a large field of application before it.

The economies affected by this new method of drawing are due not alone to simplicity and rapidity of mechanical production, but also to reduced handling of shells and a smaller space occupied by machinery and partially finished product. In addition to the economical features already mentioned, the use of this class of drawing presses is accompanied by the still further advantage of dispensing with the annealing of shells between operations, which, if the work were done in single draw presses, would be necessary. With the double draw press, the necessity for annealing is avoided by one drawing operation immediately succeeding another, while the heat generated in the first drawing remains in the shell. As annealing involves much expense in maintenance of furnaces, handling and cleaning annealed shells, etc., the economy incident to avoiding this is important. The double draw presses illustrated herewith are two out of a line of six sizes that have been built by the E. W. Bliss Company, of Brooklyn, N. Y. The performance of these machines in the considerable number of manufacturing establishments where they have been placed has resulted in very satisfactory demonstrations of their advantages.

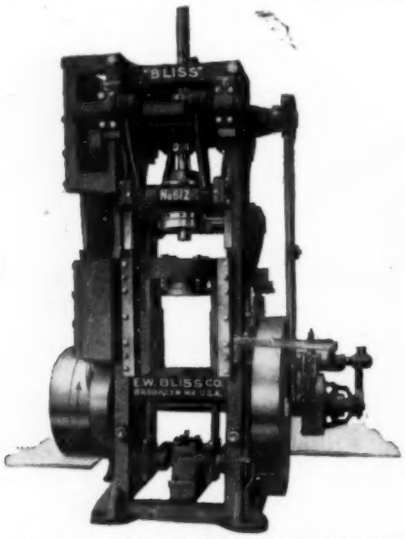


FIG. 1. PRESS FOR CUTTING BLANKS UP TO 12 IN. IN DIAMETER.

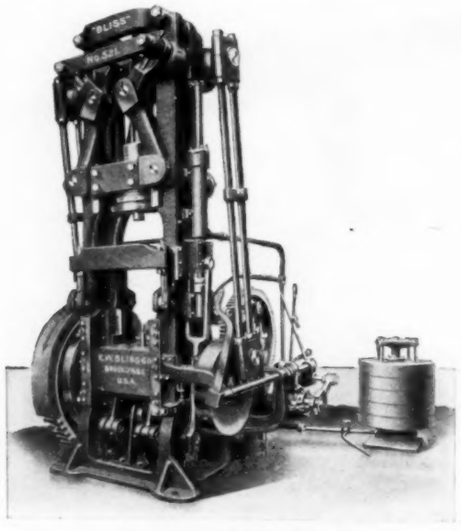
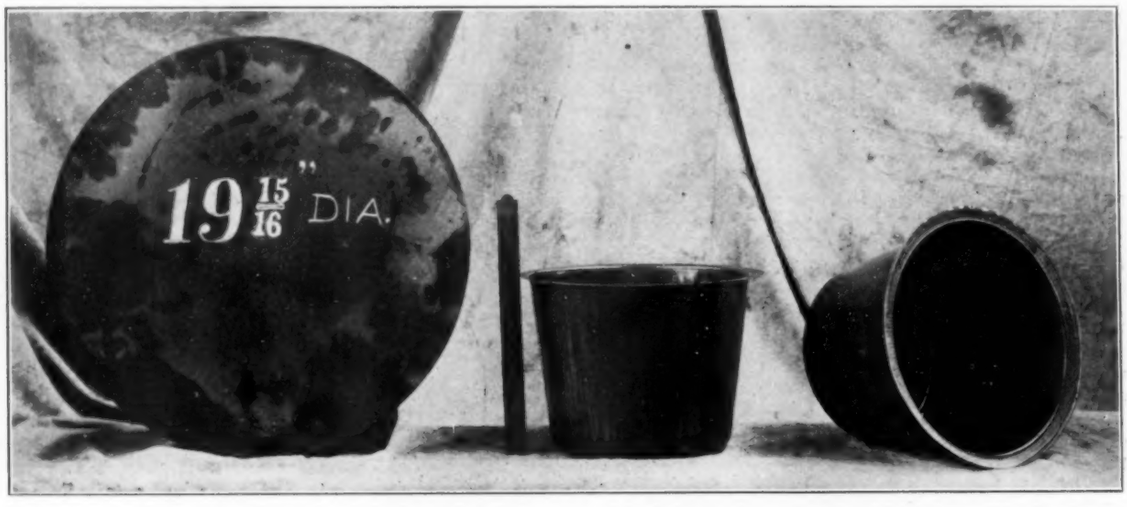


FIG. 2. PRESS TO CUT BLANKS UP TO 21 IN. IN DIAMETER.

The machines thus far made range in drawing capacity for receiving blanks up to 25 inches diameter, and producing shells up to 10 inches in depth. The smaller sizes are of a somewhat different construction than the larger, being adapted to permit the use of dies with cutting edges, in order to cut blanks, draw and redraw in one stroke. The larger sizes, beyond 12 inches diameter blank capacity are not adapted for the use of dies with cutting edges.



BLANK AND FINISHED SHELLS MADE ON E. W. BLISS DOUBLE DRAW PRESS.

Figure 1 shows a machine used for cutting blanks up to 12 inches diameter from brass sheets or strips up to No. 22 gauge

thickness, and performing two draws on them. In this machine, the die bed is fixed and rigid and the blankholder carrying the top cutting edges has motion in extremely long adjustable guides. The moving parts are mechanically balanced as far as possible and are started and stopped by means of a combined toggle friction clutch and brake, either automatically or by hand. The blankholder is actuated by toggles that receive motion from a cam, the toggles produce a perfect blankholder dwell during the drawing period and receive the blankholder pressure, relieving the cam of pressure during that time. The first draw punch slide is actuated by crank and toggle motion and the second draw punch by simple crank motion.

Figure 2 shows a machine that receives blanks up to 21 inches diameter and to No. 20 gauge thickness of brass. It will receive first draw punches up to 14 inches diameter and produce shells up to 8 inches final depth. In this machine, the lower dies are fastened to a table that has motion and are brought up against a stationary adjustable blankholder. The table is moved up and down by toggles actuated by a large cam groove in the main gear. The toggles take all the pressure due to the blankholder and the descent of the punches and so relieve the cam of any further duty than moving the table up and down. As the table is counterbalanced, its work is very light, with consequent freedom from wear. The first draw punch slide receives its motion through toggles from the second draw punch slide, the toggles providing a fine dwell for the first draw punch during the drawing period of the second punch. All the moving parts mentioned are counterbalanced during their up and down movements by a hydraulic plunger and accumulator system, rendering the starting of the press easy, certain and safe. The hydraulic accumulator can be placed wherever most convenient near by or at considerable distance from the press, below or above the floor line. The machine is driven and controlled by means of a powerful combined friction clutch and brake fitted with both hand and automatic control. Convenient adjustments are provided for puches and blankholder.

THE BONTEMPI RUST-PROOFING PROCESS

Another new method for the protection of iron or steel from rusting is the Bontempi Process, now being used by the Bontempi Rust-Proofing Company, 111 Broadway, New York, and whose factory is located at Bridgeport, Conn. A photograph of this factory is shown in the cut, and proves that the company has ample facilities to carry on the process. A small booklet issued by the Bontempi Company describes their process as follows:

PLANT OF THE BONTEMPI RUST-PROOFING COMPANY, BRIDGEPORT, CONN.

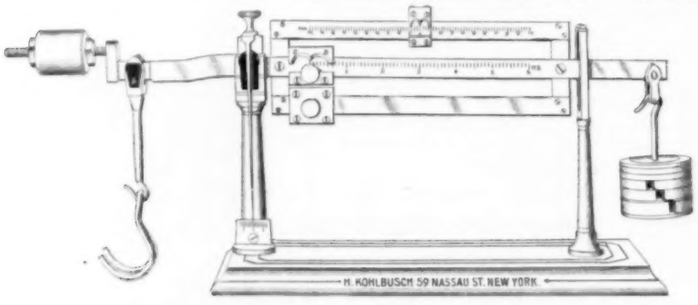
Articles to be treated are placed in a Muffle, and are then heated sufficiently so that the pores are opened, a compound of chemicals is then injected in the Muffle, creating fumes which fill the pores and fix a magnetic oxide on the iron. The articles thus treated will not rust. The depth of coating depends upon the time of treatment, but it can reach a thickness of one-sixteenth of an inch, and even more, but with the ordinary treatment the surface is not materially added to. The metal does not change its properties, except on the surface. The chemical is not poisonous or injurious. The penetrating power of the treatment is such, that in a layer of small articles one foot deep, or even more, all of the articles receive exactly the same treatment. A complicated device can be treated without being taken apart. If rust attacks the iron thus treated, on account of spoiled surface, it cannot spread as it does with other systems, as the black oxide of iron has a peculiar neutralization power or catalytic action that stops the electrolytic process of rusting. Articles thus treated will take paint and nickel-plating. The treatment has been thoroughly tested for several years, and gives protection far superior to any process so far discovered. The size or amount of iron to be treated at one time depends entirely upon the size of the Muffle.

This process takes its name from the inventor, Augusto Bontempi, and was brought out about four years ago.

The time required for treatment depends upon the character and chemical constituents of the articles treated, ranging from a half hour to an hour and a half, this latter time for steels high in carbon. When removed from the muffle, the specimens treated are of a silver gray color when cooling. An oil bath gives a dead black surface which, under the buffing wheel, can be made to take a finish like polished gun metal.

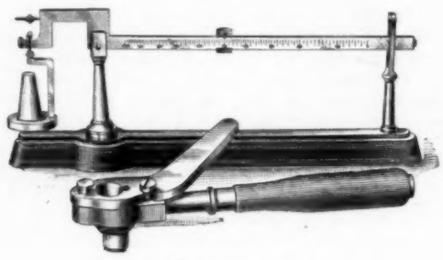
GOLD, SILVER AND SOLDER SCALES

Herman Kohlbusch, manufacturer of balances and weights of precision, with office and showroom at 170 Broadway, New York, and factory in Jersey City, N. J., has, among other instruments of interest to the trade, the scales shown in the cuts. Fig. 1 represents the new scale to ascertain the quantity of gold or silver deposited while being plated in the solution during galvanic action, or out of solution. The scale can be set to indicate when a certain amount is deposited and when same is connected with an electric current it can be made to ring an electric bell.



GOLD AND SILVER PLATING SCALES.

The top bar is divided in ¼ pwts. (⅛ can be read) to 10 pts. on each side of center, which can either be used for weighing purpose or to try how much more or less it needs to the required result. The second bar is divided up to 6 oz. troy in 2 pwts. on which the amount of precious metal deposited is weighed; this can be set at any given weight. For instance, if you suspend 4 dozen spoons from the scale hook into the solution and wish to deposit 3 oz. of silver on them, then set the weight at 3 oz., screw the weight tight and when scale balances (which is indicated by pointer on dial), you will have the required amount. The lower beam and end weights are simply to balance any material put on, and will carry 5½ lbs. suspended (which can be increased).



SOLDER TEST SCALES.

The solder test scales, shown in Fig. 2, are substantially and accurately made, with agate bearings throughout. Complete with mold. To make a test, it is only necessary to take a cast in the mold, place the cast on the scale, poise it with the slide weight, and the pointer will show the amount of tin from 0 to 100 per cent. It is said that the results obtained with these scales compare favorably with chemical analyses.

Associations and Societies

DIRECTORY OF AND REPORTS OF THE PROCEEDINGS OF THE METAL TRADES ORGANIZATIONS.

AMERICAN BRASS FOUNDERS' ASSOCIATION

President, L. W. Olson, Mansfield, Ohio; Secretary and Treasurer, W. M. Corse. All correspondence should be addressed to the Secretary, W. M. Corse, 106 Morris avenue, Buffalo, N. Y. The objects of the Association are for the educational welfare of the metal industry. Annual convention with the American Foundrymen's Association in a succession of cities as invited. The next convention will be held at Buffalo, N. Y., September 23-27, 1912.

Secretary Corse reports that the vote on the proposed amendments to the constitution, as published in the March number of THE METAL INDUSTRY, was favorable to the changes, and hereafter the association will be known as The American Institute of Metals.

The date for the 1912 convention has been definitely set for the week of September 23. The exhibition will open on Monday of that week, and the sessions of the convention proper will be held Tuesday, Wednesday and Thursday, possibly running into Friday. Arrangements have been made for headquarters at the Hotel Iroquois, and the meetings of the association will be held there.

The Committee on Papers, F. O. Clements, chairman, reports that the following papers have been promised:

1.—Dr. A. Hirsch, 51 East Forty-first street, New York, N. Y.: "The Rare Earth Metals with Especial Reference to Pyrophoric Alloys."

2.—Professor C. F. Burgess, University of Wisconsin, Madison, Wis.: "Suggested—Phenomena Connected with the Tarnishing of Metals."

3.—G. L. Norris, engineer of tests, The Vanadium Sales Company of America, Pittsburgh, Pa.: "Vanadium Alloys."

4.—Professor C. L. Parsons, chief mineral chemist of the Bureau of Mines, Washington, D. C.: "Work of Bureau of Mines As It Relates to Non-ferrous Metal Industry." (Verbal—No paper proposed in advance.)

5.—Official Chemist: "Annual Report."

6.—Dr. W. Campbell, Columbia University, New York, N. Y.: "The Practical Use of the Equilibrium Diagram."

7.—C. P. Karr, Standard Sanitary Manufacturing Company, Louisville, Ky.: "The Difficulties Experienced in Casting German Silver."

8.—G. H. Clamer, The Ajax Metal Company, Philadelphia, Pa.: "The Electric Furnace for Brass and Bronze, and Its Efficiency."

9.—H. W. Gillett, The Aluminum Castings Co., Detroit, Mich.: "The Influence of Pouring Temperature on Manganese Bronze."

10.—Some member of A. D. Little's Organization: Prospective.

11.—Dr. W. R. Whitney (by an assistant), General Electric Company, Schenectady, N. Y.: No subject announced to date.

12.—W. S. Landis, assistant to Dr. J. W. Richards, Lehigh University, South Bethlehem, Pa.: No subject announced to date.

13.—W. R. Dean, Hyde Windlass Company, Bath, Me.: "The Successful Handling of Manganese Bronze and Other Alloys in a Reverberatory Furnace, or Foundry Tests and Foundry Practice."

14.—E. Weintraub, General Electric Company, West Lynn, Mass.: "Progress of Work on Boron Suboxide as Used as a Deoxidizer in Non-ferrous Metals."

ELECTRO-PLATERS' ASSOCIATION

President, Charles H. Proctor, Arlington, N. J.; Treasurer, H. H. Reama, New York, N. Y.; Corresponding and Financial Secretary, Royal F. Clark; Recording Secretary, Edward Faint. All correspondence should be addressed to the Corresponding Secretary, Royal F. Clark, 246 Fulton avenue, Jersey City, N. J. This is an educational society, the objects of which are to promote the dissemination of knowledge concerning the art of electro-deposition of metals in all its branches. Meets at Grand Opera House Building, 309 W. 23d St., on the fourth Friday of each month, 8 p. m.

The regular monthly meeting of this association was held on April 26, with twenty-nine members present. Four applications for active and one for associate membership were acted upon favorably. Charters were granted for branches in Rochester, N. Y.; Detroit, Mich., and Toronto, Ont. The following officers were elected for the ensuing year: President, Richard H. Sliter; first vice-president, Charles A. Stiehle; second vice-president, Clarence O. Field, secretary-treasurer, Royal F. Clark; recording secretary, A. J. Stremel; editor-in-chief, August G. Hoffman; librarian, Joseph Minges; sergeant-at-arms, Thomas J. Noonan; assistant sergeant-at-arms, William H. Betz; trustees, Charles H. Proctor, Lewis H. O'Donnell, Joseph A. Straub, Frank P. Davis and C. H. Buchanan.

The election of officers of the Philadelphia branch, at the monthly meeting held April 26, resulted as follows: President, F. C. Clement; vice-president, J. R. Moore; secretary, J. L. Denan; treasurer, A. B. Wells; financial secretary, Philip Uhl; board of trustees, Hugo Hermanns, William Buckley, J. A. Wilkinson, A. Heck and M. J. Smith. Several papers are on the list for the May meeting, including one by M. J. Smith on Volt-Meters.

Another branch of this association was recently organized at Detroit, Mich., president, Arthur O'Keefe; secretary-treasurer, John J. Abler. A meeting was held on April 26, with 24 members present. John Schultz gave an interesting talk on Brass Plating with the Rotary Plater and exhibited some fine work. This was followed by a discussion on Electric Cleaners. Mr. Kutzer exhibited an old lamp finished in verde green. Meetings will be held every first and third Friday of the month at the Burns Hotel.

NEWARK INDUSTRIAL EXPOSITION

An industrial exposition will be held in Newark, N. J., May 21-25, as reported in THE METAL INDUSTRY for April, under the auspices of the Board of Trade of that city. The exposition will be held in the First Regiment Armory on Sussex avenue, between Jay and Hudson streets. There will be over 160 exhibitors, among whom are the following metal firms:

Thos. W. Adams and Company, Alling & Company, Allsopp & Allsopp, American Art Metal Company, American Button Company, American Oil and Supply Company, Art Metal Works, William Bal, Inc., The Barlow Foundry Company, Beaver Engineering Company, The A. & F. Brown Company; The Celluloid Company; Central Electrotype Foundry Company; Chemical Fire Extinguisher Company, Crane Company, Crocker-Wheeler Company, Cuspidore Manufacturing Company, William Dixon, Inc., Driver-Harris Company, Durand & Company, Ehrlich & Sinnock, Essex Foundry, General Electric Company, Gould & Eberhardt, A. Griffoul & Bros. Company, Headley & Farmer Company, Heller Bros. Company, Hewes & Phillips Iron Works, H. M. Hughson & Company, H. W. Johns-Manville Company, A. H. Jones, Jones & Woodland, The Kleno Polio Company, Frederick Koch Company, Link & Angell, The Manufacturers' Can Company, Newark Brass Works, Newark Electrical Supply Company, Newark Gear Cutting Machine Company, Newark Tube & Metal Works, Richardson Manufacturing Company, Riley-Klotz Manufacturing Company, Searls Manufacturing Company, The A. P. Smith Manufacturing Company, Wm. Snell, Inc., Turner Machine Company, The Watts-Campbell Company, Webb Manufacturing Company, Westinghouse Electric & Manufacturing Company, The Whitehead & Hoag Company, Zeh & Hahnemann Company.

INTERNATIONAL ASSOCIATION FOR TESTING MATERIALS

According to a statement made in Bulletin No. 2, issued by the American Society for Testing Materials, under date of April, 1912, the sixth congress of the society will be held in the Engineering Societies building, New York City, September 2 to 7, 1912.

ITEMS OF INTEREST TO THE INDIVIDUAL.

E. F. Lake, consulting metallurgist, has been placed in charge of the laboratory of the Perfection Spring Company of Cleveland, Ohio.

T. C. Eichstaedt, author of the article "Polishing Wheels: Their Construction, Use, Care and Abuse," which is now running in THE METAL INDUSTRY, is at present employed in the capacity of foreman plater by the Detroit Sanitary Supply Company, manufacturers of lavatory plumbing supplies, Detroit, Mich.

W. J. Smart, of the Eureka Pneumatic Spray Company, New York, well known through his improvements in lacquer and paint-spraying devices, has put out a pamphlet, giving descriptions of the Smart gas expunging apparatus, which is a device used to expunge the gases from the bore of big guns.

C. E. Brubaker, formerly proprietor of the Excelsior Plating Works, electro-platers and brass founders, Lancaster, Pa., has sold his interest to John Kreider, who will operate the plant in the future. Mr. Brubaker has taken complete charge of the polishing, grinding, finishing and plating departments of the Lancaster Foundry Company of that city.

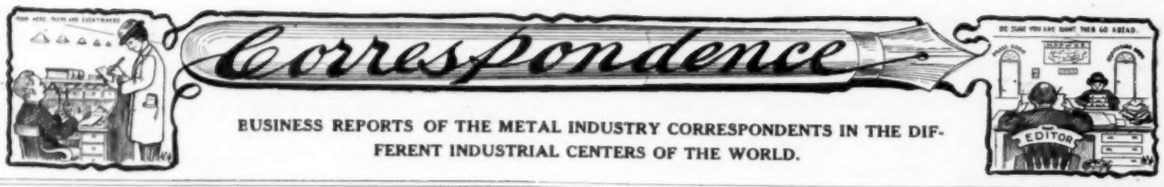
DEATHS

R. R. Maffett, general superintendent of the Orford Copper Company, Bayonne, N. J., died suddenly on April 8.

Horace J. Stevens, for the past ten years editor and publisher of "The Copper Handbook," died suddenly of heart disease at Ishpeming, Mich., on April 22, at the age of forty-eight years.

John Dickey Culbertson, second vice-president and treasurer of the National Tube Company, Pittsburgh, Pa., died suddenly at his home on March 13.

Englehardt C. Ostby, senior partner of the firm of Ostby & Barton, ring manufacturers, Providence, R. I., was one of those who lost their lives in the *Titanic* disaster. Mr. Ostby was born and brought up in Christiana, Norway, coming to Providence in 1869. Ten years later he formed the partnership with Nathan B. Barton, which exists to the present day. The business has grown gradually until it is now the largest ring house in the world.



BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS IN THE DIFFERENT INDUSTRIAL CENTERS OF THE WORLD.

WATERBURY, CONN.

MAY 6, 1912.

Waterbury has completed the first quarter of the year under favorable, if not "booming" conditions. In all its various metal industries there has been enough work to keep the factories running five or six days, with an exceptional case of overtime here and there, but on the whole the speed has not been above average. Business has been slow, jerky; not exactly unsatisfactory, yet not wholly reassuring. The only excuse apparent is presidential year. The outlook is better than many believe, and most manufacturers agree that it is promising, when interpreted with conditions in other parts of the country in metal and other industries. Perhaps the Scovill Manufacturing Company, the American Brass Company and the Chase Rolling Mill Company and the Waterbury Manufacturing Company have experienced the most even conditions since the first of the year. All these plants have been kept busy with practically their normal payroll and, most of the time, six days a week. The Waterbury Clock Company also has been fairly busy. It is perhaps owing to the splendid system of these concerns that they are so active, but the secret of the system is "eternal vigilance." They keep close to conditions and lose no opportunities to find orders. The Waterbury Farrel Foundry & Machine Company is one of the busiest concerns at this time and has experienced steady and growing business since the first of the year. The Plume & Atwood Manufacturing Company and the American Ring Company both are running on good time. Five days is the schedule at the New England Watch Company's plant and at the Randolph-Clowes Company's and at several of the smaller plants.

Chief among the events of the month which have affected the industrial field here are the smallpox outbreak and the burning of several buildings in the center of the city by a firebug. Smallpox has been causing great anxiety in Naugatuck for some time, but strict health regulations kept it out of Waterbury until early this month, when a collector whose home is here, but whose route is among Naugatuck customers, was found to be seriously ill. Smallpox was the diagnosis, and he was rushed into the isolation hospital. He had insisted on sneaking into quarantined houses in Naugatuck. Immediately the factory heads took action. There was no general order for vaccination, but the employees were left to infer that their communication with Naugatuck should be curtailed. In the plant of the Waterbury Clock Company a number of employees were dismissed temporarily owing to the illness of one of their relatives with smallpox in Naugatuck. Up to date there has been no case among the employees of any of the local factories.

Monday, April 22, saw thirteen fires in this city, within a radius of half a mile from the City Hall, and when the news passed around town that they were supposed to have been set by incendiaries, every corporation head took action. Extra watchmen were pressed into service for the night and kept on duty around the plants and yards, and in some cases they are still doing duty, for the suspected firebugs have not yet been captured. The City Hall was destroyed, and in every shop where there is a volunteer fire company among the employees the call was issued for the company to go on duty. They were prepared to go to the assistance of the city firemen at the Mayor's call.

The city, on its part, put every available policeman on duty, and the Mayor summoned three companies of militia to patrol the streets all night. The town is still standing minus a City Hall, and every factory is doing business, for the Waterbury shops enjoy additional protection to that furnished by the city, and such a loyal spirit among their employees, that they are ever ready for duty in emergencies of this kind.

For the balance of the first half of the year the outlook is good. April clearings in the Waterbury banks showed a gain of over $900,000 over those of March, but there is no immediate prospect of greater improvement in conditions in the brass industries.—F. B. F.

PROVIDENCE, R. I.

MAY 6, 1912.

Business among the metal trades is fairly good, although the manufacturing jewelers are not so busy as usual at this season. With them the determination on the part of the jobbers to postpone their buying until the latter part of May instead of the middle of April, has had the effect of curtailing activities. It is expected, however, that with the invasion of the buying contingent there will be a boom all along the line. With some of the locket houses business is reported as being exceptionally good, and orders are accumulating sufficiently to insure steady work for several weeks to come. At the Gorham Manufacturing Company all departments are running full capacity, the bronze department being especially busy with orders enough to keep it going for two years. Recently the company was awarded one of the largest orders for silverware ever made—that of 18,000 pieces of silverware for the new Hotel Baltimore, New York City. Special designs have been drawn and the order includes coffee and tea pots, platters, plates, sugar and finger bowls, pitchers and add pieces, and the designs are of such a character that the table settings may conform with the general scheme of decoration.

Notwithstanding the general cry of dull business during the greater part of the year 1911, the net earnings of the Gorham Manufacturing Company fell only $50,000 short of the exceptionally large results attained in the previous year. The net in the year 1910 was a little more than $700,000, while the 1911 net amounted to a few dollars less than $650,000; the year's surplus for 1911 was about $230,000, while the total surplus stands better than $3,000,000. The company's business late in 1911 displayed a large increase, and corresponding gain in earnings, so that the 1912 year began under bright auspices. Full reports are not made public by the Gorham operations, but the conservative preferred stock of this, the world's most famous silver concern, is largely held by home investors, and sells on a 5 per cent. basis, although paying a cumulative 6 per cent. dividend.

The Metal Products Corporation is defendant in suits filed in the Superior Court for damages aggregating $20,000. Benjamin Slavin, a minor, who in January last had two fingers taken off by reason of an alleged defective drop press or stamp, sues to recover $10,000, and his mother, Ellen, seeks $5,000 damages for loss of his services. Thomas Brady is the third plaintiff, and he asks $5,000 for the loss of a finger in a similar way to that of Slavin in November, 1911. Three girls and a man had narrow escapes in a fire which destroyed one room of Thomas A. Jackson & Company's manufacturing jewelry plant on the fifth floor of the Calender building, Calender and Sabin streets, on the afternoon of April 24. Almost before they were aware of it the corner of the room in which they were working was all ablaze, and, panic-stricken, the girls were forced to flee down a fire escape, followed by Bernard Peterson, senior member of the jewelry firm of Peterson & Company, on the same floor.

Water damaged the Progressive Jewelry Company and Thomas McGrath Jewelry Company on the fourth floor; Frank Flynn Jewelry Company, and the Standard Nickel Plating Company on the third floor, and the J. Solinger Company, manufacturing jewelers, on the second floor. The damage aggregated about $7,500. John H. Campbell has purchased the entire interest in the Alger Sheet Metal Company at 133 Washington street, which he will continue.

The George W. Parks Jewelry Company, of this city, has purchased the real estate and building of the Westerly Narrow Fabric Company at Westerly, for $15,000. The company will manufacture jewelry therein.

The Superior Court has granted the petition of James N. Henry and others to dissolve the C. P. Henry Novelty Company, a corporation under the laws of Rhode Island.—W. H. M.

NEWARK, N. J.

MAY 6, 1912.

The manufacturing jewelers and silversmiths have had a steady demand so far and expect pretty fair conditions the rest of the year. The demand is mainly for 10 karat gold goods, which are in strong demand. The 14 and 18 karat lines have not held up very well. The advancing price of platinum and the exclusiveness of that metal, owing to the high price of such products for the rich, has resulted in a good, strong, steady demand for these goods. The price is no object. Many of the articles made are to order, and some beautiful combinations have been made in connection with diamonds. They are works of art and a pleasure to behold.

Mr. Blank, of Whiteside & Blank, is chairman of the committee having charge of the scholarships to be awarded at the Pratt Institute, Brooklyn, Bertram Goldman, formerly with the Ziruth-Kaiser Company, of this city, opened an office at 8 Maiden lane, New York City, as manufacturer's agent. John C. Blevney, who makes machinery for platers, polishers, etc., has much better quarters since moving to 209 Parkhurst street.

J. W. Rosenbaum & Company have completed their new factory building for the jewelry manufacturers, at Broad and Astor streets, at a cost of $60,000. It is six stories in height, and is said to be fireproof. He will also build an apartment house adjoining this property.

A new building for the jewelry manufacturing trade has been built at Mulberry and Oliver streets, by J. S. Hobbs. It is needed, as there are too many of these old structures here.

Long & Koch, manufacturing jewelers have got down to business in good shape in their new factory building at 126 South street. Their salesmen have been out some time selling the 10-karat lines to the jobbers and the firm are quite busy.

H. A. Hulslander, of 5 North Stockton street, Trenton, making hammered brass work, is getting out of that line somewhat and is doing more die cutting. He has opened a store across the street at No. 6.

J. F. Curry Manufacturing Company, of Mulberry street, making metal parts for the automobile and carriage trades, have improved their pattern room, put in new tumbling barrels, added to the foundry, new tub, extra furnaces and new blowers to draw the dust from all the wheels. A new clutch was put in to stop the power in case of accidents, and added to the plating room. He has dropped the automobile lines some and added to the carriage lines in brass and bronze work. Has put out a patent foot rail, a tire carrier and is making a lot of fixtures for fire wagons. The retail trade he has cut out and will sell to the wholesale trade only. Will make brass and bronze castings more than ever. He has got up a device so that when two men are working at a buffing wheel one can stop work while the other can keep going, while before both had to stop at once.

Carl F. Hamann, who used to be with Durand & Co. and Tiffany & Co., is the instructor in jewelry work at the Pratt Institute, Brooklyn.—H. S.

ALBANY, N. Y.

William Cohn, of 42 North Pearl street, has greatly enlarged his manufacturing jewelry and silversmith plant, has put in a lot of new machinery, plating plant and has several salesmen out. He already finds his enlarged quarters too small and contemplates taking the whole floor, and if he does will want much more equipment. He has one of the most up to date plants one can see.

Quayle & Son, of Monroe and Chapel streets, manufacturing jewelers, making largely medals and badges, have erected a large jewelry factory on the Troy Road, at the north end of the city, which will give them a much larger output. New machinery is now being put in and the latest and most modern equipment. Having offices in New York and Chicago, with some twenty salesmen on the road, makes a large output necessary. They will move to the new plant in the spring.

The Boston (Mass.) Optical Company have established a plant here in the Lyon Block, in charge of Mr. Dawson, to turn out all the work required for the optical trade through New York State. The plant is well fitted up and is starting out with a good trade.—H. S.

PITTSBURGH, PA.

MAY 6, 1912.

Official announcement has just been made by the Aluminum Company of America to increase its capacity at New Kensington. Employment will be given to 2,000 additional men. This means that the population of Arnold, New Kensington and Parnassus will practically be doubled.

Attorneys for the Aluminum company have applied to the borough council of Arnold asking for street changes and plans were presented providing for a large building above the upper plant of the American Steel & Tinplate Company and a second near that of the American Glass Works.

J. T. Speer, president of the American Foundrymen's Association, has announced the postponement of the Buffalo convention from June until the week beginning September 23. The postponement is due to advices received from the Buffalo entertainment committee to the effect that improvements aggregating $150,000 are being made at the Buffalo armory in which the exhibits are to be displayed. Headquarters for the various associations have been selected with the exception of the Foundry Foremen's Association. The American Foundrymen's Association will be quarters at Hotel Statler where the various sessions of the convention will be held. The Brass Foundrymen's Association will hold forth at Hotel Iroquois and the Exhibition Company at the Hotel Lafayette.

Pittsburgh delegates to the convention have applied to the Industrial Development Commission of Pittsburgh for co-operation in the effort to secure the next convention for Pittsburgh and a large delegation will be sent and a campaign waged to bring the next event to this city.

CLEVELAND, OHIO

MAY 6, 1912.

Business has proven very satisfactory to brass and aluminum manufacturers and foundry men in this territory. The automobile business is now in full swing and the demand for brass and aluminum castings is very active as a result. General manufacturing is not as brisk as it perhaps ought to be, but nevertheless it is very good for this time of the year. As an indication of this it might be stated that one brass manufacturing company is just closing an order for $20,000 worth of solid brass valves for a big hardware house here. These valves are to be used in connection with the fitting up of factories in this and other adjoining territories. The building trade having revived, the demand for plumbing goods is also very keen, and this summer promises to see a fine line of business.

The Buckeye Aluminum Company, of Doylestown, Ohio, during the past month increased its capital from $100,000 to $150,000. It is intended to use the new capital to extend the manufacturing facilities of the plant.

Aluminum molders, who are on strike at the plant of the Aluminum Castings Company, 6205 Prospect avenue, charged a party of 25 non-union molders and coremakers one day a week or two ago and created a small sized riot. One of the guards at the plant was knocked down and severely beaten. The guard drew a revolver and shot one of the strikers in the ankle. The strike is still on at the foundry.

Frank Gregg, president of the Standard Brass Foundry Company, 6608 Central avenue, will rekindle the "underground railway" light in the window of John Rankin's home, near Ripley, O., that once showed fleeing slaves the way to freedom. Gregg once lived in Ripley. The light will burn every night from a flagpole in front of the house. He will also erect there two monuments and eleven bronze tablets in memory of the five admirals and three generals who were natives of Ripley. It was at this place that Eliza, the slave in "Uncle Tom's Cabin" crossed the ice, and the light from Rankin's house guided her to safety. General Grant went to school in Ripley.

The Cleveland Metal Products Company, Ivanhoe road and the Nickel Plate Railroad, is erecting a one-story building 80 x 250 feet in size, to be used for the manufacture of metal goods.

The Columbia Metal Stamping Company, of Cleveland, has been incorporated with a capital of $25,000, by Fred C. Koch, James C. Ertel, Harry C. Gahn, Frances Koch and Elenor J. Ertel.

The A. L. Amsden Jewelry Company, of Cleveland, has been incorporated for the purpose of manufacturing jewelry, with a capital of $25,000. The incorporators are: Elizabeth N. Amsden, Arthur D. Amsden, William A. Southam, Raymond B. Tinkler and Sidney Bush.—S. L. McM.

DETROIT, MICH.

MAY 6, 1912.

The brass and aluminum industry in Detroit during the last month has been unusually good, manufacturers all reporting many orders and prospects for a continued good trade until well along into the summer. Manufacturers of plumbers' supplies are particularly well fixed for orders. Every factory in this line is operating full handed. These goods are sent all over the country. This presidential year does not seem to affect business in the least here in Detroit.

The handicap reported a month ago—the car shortage—has greatly improved, and it is not believed now that any serious inconvenience will occur again in this regard. The opening of navigation on the lakes brought the trouble to a sudden end and at the same time the strenuous efforts on the part of the Board of Commerce succeeded in straightening out the railroads to some extent. While there is not a surplus of cars, sufficient are at hand, however, in which to handle the bulk of Detroit's manufactured products with no great trouble. The railroads suddenly came to a realizing sense that something must be done at once and they got busy. They did not want to see industrials leave Detroit. As a result cities which have coveted some of Detroit's fifty or more automobile establishments will have to retire disappointed.

The automobile industry continues at its usual record-breaking pace. This is going to be one of the greatest years in the history of the industry. The Ford company at the beginning of the year started out to produce 75,000 cars, and indications are that they will succeed. The allotted quota has been produced each month since the first of the year. It is requiring about 7,000 persons to accomplish the task.

The striking brass and aluminum molders are still out, with no very great prospects on going back to work, for some time at least. It probably will be a long, drawn-out contention before an agreement is reached.—F. J. H.

TRADE NEWS

TRADE NEWS OF INTEREST DESIRED FROM ALL OF OUR READERS. ADDRESS THE METAL INDUSTRY, 99 JOHN STREET, NEW YORK

ADDITIONAL TRADE NEWS WILL BE FOUND UNDER "CORRESPONDENCE."

It is reported that The Cleveland Bronze & Brass Company, Cleveland, Ohio, is building a new concrete factory.

The current trade press reports that The Manitowoc Brass Foundry Company of Manitowoc, Wis., will enlarge its plant.

The Waterbury Buckle Company, Waterbury, Conn., are erecting a building about 146 by 65 feet, which will be used mostly for plating and lacquering purposes.

The Northern Brass Works, Waukegan, Ill., deny that they are preparing for the building of an addition to their plant to provide facilities for added lines of manufacture.

The Standard Metal Manufacturing Company, Newark, N. J., is erecting a three-story addition, 45 by 110 feet, to its factory at Chestnut and Malvern streets.

The General Electric Company, of Schenectady, N. Y., report that they have as yet reached no definite conclusion regarding the erection of a lamp factory at Boston, Mass.

The Doehler Die-Casting Company, Brooklyn, N. Y., have established a Detroit office in the Ford building, under the direction of the vice-president of the company, H. B. Griffin.

It is reported that the National Brass Bed Company, J. A. Schlitz, manager, Cleveland, Ohio, will equip a plant for the manufacture of brass beds.

The British Aluminum Company, Ltd., reports that their profit for the past year was $761,662, which was especially satisfactory in view of the prices which ruled during that period. The increase for the year was $129,369.50.

The Imperial Bearing Company, Detroit, Mich., have taken out a permit for the erection of a one-story fireproof factory, to be used for the manufacture of their line of Imperial annular ball bearings.

The Toledo Machine & Tool Company, Toledo, Ohio, report, through Charles W. Greening, treasurer, that they have contracted for a three story iron and brick building, 90 by 115 feet, which will be used in connection with their present business.

The J. O. Speed Company, 19 Genesee street, Buffalo, N. Y., specialists in all gold and silver plating, distinctive colorings, oxidizing and verdi antique finishes, are increasing their plant. They plate anything from the finest and most delicate jewelry to the gold lining of the largest hollow ware.

The Waterbury Brass Goods Corporation, Waterbury, Conn., is considering plans for the construction of three brick buildings as additions to their plant. The largest will be 152 by 42 feet, four stories high. The second will be 57 by 42 feet, two stories high, and the third, 50 by 42, one story.

The French Manufacturing Company, Waterbury, Conn., drawers of small tubing, report that they are considering the erection of a new building. The plans call for a part of it, 40 by 80 feet, to be one story high; and the remainder, 40 by 100 feet, to be two stories. The building will be of brick and steel, with concrete floors.

The Vanguard Manufacturing Company, Washington and Desplaines streets, Joliet, Ill., manufacturing Vanguard wind shields, are now receiving estimates on their new building, which is to be erected this summer. The demand for their product has grown to such dimensions, that their present quarters are too inadequate.

The Edward Schroeder Lamp Works, manufacturers of lighting equipment for railway cars, Jersey City, N. J. report through M. P. Stevens, manager, that they have purchased all of the patterns and dies formerly used by the Enos Company, lamp manufacturers of New York City; also certain patent rights.

The J. D. Smith Foundry Supply Company, foundry engineers and manufacturers, Cleveland, Ohio, report, through F. A. Coleman, president, that they are installing three oil-fired core ovens, a setting for eight aluminum furnaces, oil-fired and all of the other equipment for the new foundry of the U. S. McAdamite Metal Company (Brooklyn, N. Y.), at Detroit.

Another department is being added to the modern and well-equipped plant of the Fedders' Manufacturing Company, 59 Tonawanda street, Buffalo, N. Y., manufacturers of automobile radiators, etc. This new department is being installed by the S. A. Day Manufacturing Company, 10-12 Pearl street, Buffalo, N. Y., a new and enterprising plating supply house, manufacturers of platers' supplies.

Bureau Brothers, brass and bronze founders, Philadelphia, Pa., have begun the erection of their new plant which will be larger than the present one, which they have sold. The building will be 194 by 100 feet and two stories in height. The first floor will be given over to the foundry, while the second floor will be occupied by the office, studio and drafting room.

At Fort Plain, N. Y., the Associated Business Interests have organized and raised a fund for a publicity campaign, with the object of bringing new industries to that town, particularly those employing male help. The transmission line of the Mohawk Hydro-Electric Company has recently been completed into the town, and several plants have been equipped with electric drive.

The Waterville Corporation, manufacturers of brass goods, Waterville, Conn., has taken out a permit for its new one-story plant. The building, which, it is understood, is to be used for a tube mill, will be of brick and steel, 300 by 180 feet. The Waterville Corporation is controlled by the Chase interests of Waterbury, which also owns the Chase Rolling Mill, the Waterbury Manufacturing Company and the Waterbury Clock Company.

It is said that the suit of the United States against the Aluminum Company of America, to compel the latter to conform to the Sherman Anti-Trust Law, will be amicably arranged. The decree, it is believed, will not provide for a dissolution of the corporation, but issue an injunction against certain of its contractual relations. It is the understanding that the suit will be filed in Pittsburgh, when the parties thereto will make their appearance in court and the decree agreed upon will be then entered.

The United States steamship *Florida*, which has just won the title of the world's fastest battleship, broke all speed records off the Atlantic Coast with propellers of Monel metal. The *Florida* attained a greater speed than its sister ship, the *Utah*, which was not equipped with that material. Monel metal is very suitable for propellers. It has the strength of steel, and is less corrodible than bronze. The non-corrodibility is a strong asset, as it assures the propellers cutting the water cleaner. Propellers of this material have been furnished battleships of the United States and foreign navies.

The National Manufacturing & Electroplating Company, Providence, R. I., report, through R. A. McIntire, manager, that they have about 3,000 feet of floor space and are fitted up at present for a general line of nickel, brass and copper plating; and intend to install at once a 100-gallon silver solution, and a little later on will add a gold solution. While at this time they are equipped for plating only, they intend to go into the jewelry manufacturing business later. Mr. McIntire and G. F. Masterson are the principal owners of the concern, which is located at 16 Calender street.

The Pease Foundry Company, manufacturers of furnaces and heaters, Toronto, Ont., report, through R. B. Mackinnon, sales manager, that they contemplate building an entirely new plant at Brampton, Ont., to take the place of their present plants at Toronto and New Toronto. Eleven distinct buildings will be erected, which will aggregate a floor space of 137,000 square feet. They will all be of one-story except the office, which will be two stories, and will include a foundry, warehouse, shipping room, blacksmith shop, machine shop, core room and ovens, rumbling room, pattern shop, vault and dome, and tin shop for the manufacture of furnace casings.

The New York Buff Company, 85 Centre street, New York, have secured the services of George H. Chandler, formerly the New York City representative and export sales manager of the Munning-Loeb Company, to represent them in the sale of their buffs, composition and other polishers' and platers' supplies, of which they carry a complete line. This concern has long been engaged in the manufacture of buffs, compositions, etc., and has recently made extensive improvements in their manufacturing facilities, and are planning to extend their business materially. They state they would be glad to receive inquiries from consumers of anything in their line for either domestic or export shipment.

The Bureau of Supplies and Accounts, Navy Department, Washington, D. C., will open bids on May 21 for the following material. Schedules may be obtained from the Navy Pay Office nearest each navy yard. At the Navy Yard, Brooklyn, N. Y.—Sch. 4509, wire, lighting and power (rubber insulated), lead covered; sch. 4514, sheathing, metal, Muntz; sch. 4517, brass, rod; nuts, brass. At the Navy Yard, Boston, Mass.—Sch. 4513, burrs, copper, etc.; sch. 4514, tubing, seamless, brass voice; solder, half-and-half; solder, spelter; solder, wiping, soft; sch. 4519, tin, roofing, terneplate. At the Navy Yard, Norfolk, Va.—Sch. 4514, solder, half-and-half; sheathing, copper; sch. 4517, brass, sheet, rolled; tubing, copper.

The following bids will open May 28: At the Navy Yard, Mare Island, Cal., Sch. 4537; brass rod, brass sheet, bronze rod, rolled, medium; monel metal; brass seamless pipe. At the Navy Yard, Brooklyn, N. Y., Sch. 4537, manganese bronze ingots.

The Commercial Bureau Company, which maintains The Manufacturers' Library, located in accessible and commodious quarters on the main floor of the Hudson Terminal building, 50 Church street, New York, announces the establishment of a new foreign service for the use and benefit of American manufacturers who are interested in exporting their products. This service includes among the features the providing of briefs of manufacturers' catalogs, printed in English and other languages, on cards, 3 by 5 inches, these cards to be filed in every American Consulate the world over. A similar card index plan, in connection with domestic trade in the United States, has been taken advantage of by many manufacturers and has proved quite successful. The cost to the manufacturer is moderate. The use of the Manufacturers' Library, referred to above, is offered free to manufacturers or their representatives and to all buyers residing in or visiting New York. Desks and consultation rooms are provided free and typewriting and telephoning facilities at nominal cost. More than 800 trade journals, directories and statistical publications are on file. Manufacturers may file and index their catalogs here at an annual cost of five dollars.

The Apothecaries Hall Company, 18 Benedict street, Waterbury, Conn., have been sending out circulars calling attention to the new State law governing the selling of adulterated turpentine in Connecticut. This law provides that "no person, firm or corporation shall manufacture, mix for sale, offer or expose for sale, or have in his or its possession with intent to sell, or sell, under the name of turpentine or spirits of turpentine, any article which is not wholly distilled from rosin, turpentine gum or scrapings from pine trees, and unmixed and unadulterated with oil, benzine or any other substance of any kind whatsoever, unless the package containing the same shall be stenciled or marked with letters not less than two inches high and one inch wide, 'adulterated spirits of turpentine.'"

Heavy fines are provided for the offender who violates the law. The Apothecaries Hall Company, believing that manufacturers are entitled to know what they are buying, were quite influential in having this law passed and intend to exert themselves to have, if possible, similar laws passed covering various materials used in the metal and plating trades. Heretofore the buyer who had become a victim of misrepresentation on the part of the seller of chemicals has been obliged to take the initiative in prosecuting the seller for fraud if he wished to secure redress. The new law puts the responsibility for its enforcement on State officials.

ELECTIONS

At the annual meeting of the stockholders of the Joseph Dixon Crucible Company, held at the company's main office in Jersey City, N. J., April 15, the retiring Board of Directors, consisting of Geo. T. Smith, William Murray, Edward L. Young, William H. Corbin, Geo. E. Long, William G. Bumsted and

Harry Dailey was unanimously re-elected. Officers elected for the ensuing year are as follows: President, Geo. T. Smith; vice-president, W. H. Corbin; treasurer, Geo. E. Long; secretary, Harry Dailey; assistant treasurer and assistant secretary, J. H. Schermerhorn.

FIRES

A loss of about $5,500, covered by insurance, was caused by fire in the polishing department of the Aluminum Manufacturing Company, Des Moines, Iowa, on the afternoon of April 8. Fortunately the new addition to their plant had just been completed and they were enabled to move therein, thus losing no time. The company reports that none of their machinery was damaged and the factory is now running in fine shape.

The buildings and plant of the Brown's Copper and Brass Rolling Mills at New Toronto, Ontario, were completely destroyed by fire on April 7. The loss was covered by $120,000 insurance. It is understood that the machinery and muffles were undamaged, the loss being confined mainly to the buildings. The factory has been in operation nearly three years and furnishes employment for 110 men. It is stated that the plant will be rebuilt at once and will be in operation within four months.

REMOVALS

The Celluloid Zapon Company, lacquer manufacturers, have removed their general offices from the Metropolitan building to 200 Fifth avenue, New York City.

George W. Heath & Company, manufacturers of gold and silver fountain pens, have moved from 380 Canal street, New York City, to 208 First street, Newark, N. J.

Hess & Son, manufacturers and dealers in "Tinol," a combined solder and flux for all purposes where solder is used, have removed to their new and larger quarters at 666 North Broad street, Philadelphia, Pa.

The Niagara Brass Manufactory, formerly the Niagara Brass Manufacturing Company, 59 Terrace, Buffalo, N. Y., will move their plant to larger and more spacious quarters at 163 and 165 Adams street, Buffalo, N. Y. They will occupy 20,000 square feet of floor space and will engage in foundry and finishing of brass, bronze and aluminum, also polishing, nickel plating and enameling. A new plant has also been added—the press department. They will also handle a large supply of sheet metals.

The main office of the Ansonia Brass & Copper Branch of the American Brass Company was removed from 99 John street, New York, to Ansonia, Conn., on April 27. The company state that this change was made to facilitate business and to bring them into closer touch with the manufacturing departments. The New York office will be retained but only for use as a branch sales office for the New York territory. A number of the employees, including J. J. Lockwood, were of necessity also transferred to Ansonia.

The Abbott Ball Company, now at 9-19 Hicks street, Hartford, Conn., expect to move into their large new factory in the Elmwood district at Hartford, within a few weeks. In their new plant that will have greatly increased facilities for turning out the well-known Abbott Tumbling Barrel and Abbott carbonized steel balls, which are used in the Abbott Process of burnishing metal goods. The company reports a constant growth in their business and states that they have continually improved their methods and equipment until they have reached the point where articles burnished by the Abbott Process show a perfectly hard, smooth and brilliant surface, far superior to that obtained by hand burnishing, and secured at a fraction of the cost of hand burnishing.

DISSOLUTION OF FIRM

The partnership of Wayne J. Yerger and N. Burnham, known as the Colonial Brass Foundry, Reading, Pa., has been dissolved, Mr. Yerger selling his interest to his partner. Mr. Burnham will continue the business under the same name. The concern specializes in chandelier castings and automobile brass and bronze parts. They are also putting in a line of machinery for brass finishing.

BUSINESS TROUBLES

The Frankfort Brass Manufacturing Company, Frankfort, is now going through bankruptcy in the Federal Court, and Braden Clark of that city has been appointed receiver, giving a bond of $10,000. The receivership was created upon application of creditors of the insolvent concern.

INCREASE OF CAPITAL STOCK

The D. C. Manufacturing Company, manufacturers of plumbers' brass goods, Canton, Ohio, have increased their capital stock from $75,000 to $100,000.

The Buckeye Aluminum Company, manufacturers of aluminum castings, Wooster, Ohio, have increased their capital stock to $150,000, and will buy equipment for an enlarged plant.

INCORPORATIONS

Business organizations incorporated recently. In addressing them it is advisable to include also the names of the incorporators and their residence. Particulars of additional incorporations may frequently be found in the "Correspondence" columns.

The Rochester Brass & Wire Works Company, Rochester, N. Y. Capital stock, $100,000. Directors: G. E. VanLaer, G. R. Helmer and R. L. Saunders.

The Chicago Copper & Chemical Company, Chicago, Ill. Capital, $150,000. To manufacture, refine and deal in metals, alloys, etc. Incorporators: Winthrop Collidge, C. R. Foster and F. A. Simmons, all of Chicago.

The Superior Welding & Machine Company, Inc., Stamford, Conn. Capital, $13,000. To manufacture machinery and do a welding business. Incorporators: C. D. Roehr, Louis Roehr and C. F. Rittman, all of Stamford.

The American Welded Chain & Ring Company, New Brunswick, N. J. Capital, $25,000. To manufacture welded wire chains, rings, castings, forgings, etc. Incorporators: C. C. Thatcher, Jr., J. E. Alexander and W. E. Sperling, all of New Brunswick.

The Hammond Brass Works, Hammond, Ind. Capital stock, $435,000. To manufacture brass valves and other articles. Directors: C. H. Mayer, J. E. Brennan, U. G. Cassady, J. F. Lammering and W. Wolter, all of Hammond.

Mauston Aluminum Company, Mauston, Wis. Capital stock, $16,000. To manufacture aluminum goods and specialties. Officers: M. L. Bunnell, president; W. B. Curran, vice-president; W. S. Marvin, secretary; B. F. Broezel; E. W. Frenz, manager; Robert Stegeman, superintendent, and W. R. Griep, master mechanic.

The H. S. Wyckoff Company has been incorporated, with temporary offices at 78 Barclay street, New York. H. S. Wyckoff, the organizer of this company is well-known as a dealer in platers' and polishers' supplies, and the new company will shortly establish larger quarters and extend the business to include every possible requirement in the line of supplies for platers and polishers.

The Forsythe Metal Goods Company, Buffalo, N. Y. Capital, $30,000. To take over and continue the business of the Forsythe Manufacturing Company. The company expects to enlarge its line, which at present consists of bathroom fixtures, hardware specialties and bicycle parts. The officers are: J. H. Price, president; H. B. Rose, vice-president and manager; D. N. Whittington, secretary.

PRINTED MATTER

Die Castings of all descriptions are described in the new catalog entitled, "Veeder Products," issued by The Veeder Manufacturing Company, Hartford, Conn. These castings are used in all kinds of automatic registering apparatus, such as speedometers, odometers, etc. Copies of the catalog mailed upon request.

Valves: The Kelly & Jones Company, Greensburg, Pa., manufacturers of plumbers' supplies, give ten reasons why their iron-bound valves should be used in preference to others in a post card folder just issued.

Furnaces: The W. S. Rockwell Company, New York, have issued a handsome book of specimen views from their new catalog, which is now in the course of preparation. These views are handsome half-tone reproductions of actual installations of the various kinds of furnaces that have been installed by this company in different parts of the country.

Sand-blast: Leiman Brothers, New York, have issued a circular relating to their patented sand-blast apparatus, running in price from $17 up. This apparatus is intended for matt finishing and frosting on metals, glass and other materials, and for cleaning small castings and patterns, as well as for other work. Quotations for this sand-blast furnished on receipt of particulars as to kind of matter required.

Jackohol: The Watson-Stillman Company, Hydraulic Engineers, 50 Church street, New York City, have developed a filling liquid for hydraulic tools such as jacks, presses, punches, benders, etc., that does not freeze, thicken, gum or change chemical composition, and is invariably protective to the metal surface and packings with which it comes in contact. This liquid, called Jackohol, is described in a newly issued folder, Bulletin J, which will be sent to anyone interested.

Perforated Metals: The Clinton Wire Cloth Company, Clinton, Mass., have a very interesting catalog giving descriptions and illustrations of their products in the way of perforated metals, which include brass, tin and soft metal perforations. The catalog consists of 32 pages and states that, in addition to the perforated metal specialities, the company manufactures wire cloth, netting, fencing, lath and electrically-welded fabrics of every description, specifications for which will be sent upon request.

The Valve World: The April issue of The Valve World, No. 1, vol. viii, is a memorial number of Richard Teller Crane, the president and founder of the Crane Company, who died January 8, 1912. The book is handsomely embellished with a fine half-tone frontispiece of Mr. Crane, and numerous pictures relating to the various incidents that have characterized Mr. Crane's long and busy life. The subject matter is divided into six parts, showing the varied sides of the founder of the Crane Company. The first portion treats of Mr. Crane as an iron master; the second as a real builder; the third as a real friend of real education; the fourth as a maker of men; the fifth as the employer, and the sixth as the "man." Copies of this interesting memorial may be obtained upon request from the Crane Company, Chicago.

CATALOG EXHIBIT

An exhibition of every kind of catalog may be seen at The Metal Industry office, 99 John street, New York. The Metal Industry is prepared to do all of the work necessary for the making of catalogs, pamphlets, circulars and other printed matter. Estimates will be furnished for writing descriptions, making engravings, printing, binding, for the entire job from beginning to end or any part of it.

ADNEWS

The Karns Manufacturing Company, Springdale, Pa., are advertising their facilities for making sheet iron stampings. They desire to communicate with parties who wish to place orders for the manufacture of patented articles.

The Apothecaries Hall Company, 18 Benedict street, Waterbury, Conn., announce that, being direct importers of the finest grade of catgut lathe bands, made expressly for them in Germany, from best violin gut stock, they are in a position to furnish a better article than can be obtained elsewhere in this country, and at lower prices and with more feet to each length than regularly supplied.

The Eureka Pneumatic Spray Company, 276 Spring street, New York, who claim to have introduced into this country the method of spraying lacquer and enamel lacquer by means of air brushes, are making a special offer to supply a complete spraying outfit for $50. This includes an air compressor, air receiver, gauge, safety valve, tank drain cock, air filter, hose and a Eureka sprayer of one-pint capacity. This company also sell lacquer enamel and are featuring their "One Coat" Pure Zinc White Lacquer Enamel, which, they claim, dries glossy and is odorless.

The Lignum Chemical Works, Meeker & Van Dam streets, Brooklyn, N. Y., call attention in the advertising pages to the fact that they are the first concern to take up the quesion of furnishing a steady supply of graded rock maple sawdust for use in drying out metal goods. They furnish this sawdust in five grades of fineness, kiln dried and free from all tarnishing acids or corrosives. They have also put on the market a special grade of sawdust suitable for certain kinds of work which they sell at a lower cost than the rock maple. Boxwood sawdust is another of their specialties. Manufacturers anywhere east of Chicago can afford to have sawdust shipped to them by this concern without finding the freight rates prohibitive. The company states that orders for anything from a sack to a carload will be shipped promptly, and a casual glance into their enormous warehouse in Brooklyn would indicate that they could even ship by the trainload.

INQUIRIES AND OPPORTUNITIES

Under our directory of "Trade Wants" (published each month in the rear advertising pages), will be found a number of inquiries and opportunities which, if followed up, are a means of securing business. Our "Trade Want Directory" fills wants of all kinds, assists in the buying and selling of metals, machinery, foundry and platers' supplies, procures positions and secures capable assistants. See Want Ad. pages.

METAL MARKET REVIEW

COPPER.

NEW YORK, May 6, 1912.

The market has been held firmly at 16 cents by the larger selling agents. Actual sales have been made by dealers and second hands at from 10 to 15 points lower, and the legitimate demand for the red metal has been supplied without any fancy pyrotechnics or further boosting of the already highly inflated copper prices.

We said a month ago that the actual business during the month of March did not justify any such advance, and that prices were artificially high. We have no reason to in any way amend or alter this view of the present position. There are still plenty of optimistic estimates in evidence. Mr. M. E. Appelbaum only last week said: "By May 8 we shall have a 16½-cent copper market." We are also told "Copper is not going to sell below 16 cents at any time this year." Other bullish estimates predict a 17-cent to 20-cent market for the balance of the year. This, of course, may all come true, or it may not. Consumers were really jockeyed or "jollied" into this last rapidly advancing market, but whether they can be as easily induced to rush in blindly and place their July and August requirements with the same keenness is rather a question. Europe does not seem to be buying 16-cent copper as readily as she bought all the way up from 12 to 14 or 15 cents. The mail advices we get from London almost invari-

ably refer to the strong bull speculative clique that started this movement, and this same speculative movement is now being nursed and helped along, we are told, as follows: "Meanwhile, under the influence of continued strong American reports, there has been a fresh, active, speculative demand," and further on we are told—still speaking of the London market—"Today the market improved sharply on big buying orders attributed to America." That looks very much like manipulation, but of course we would hate to suggest anything like that.

Frenchmen do not seem to swallow this bulge in copper very gracefully. This is what comes from Paris: "We cannot help being struck," writes the *Debats* of Paris, of this season's advance in copper from 13⅝ to 15¾ cents a pound, "with the manner in which New York has conducted the rise in the price of copper. The application of brute force to the market by the big speculators is a little too much in evidence to make it possible to admit that the rise is a natural response to increased consumption."

"The truth is, we have a thousand reasons to distrust these American manipulators and the way in which they manage their business. How many times have not the European markets already been made the dupes of these maneuvers and been led to believe in the permanency of a movement which was really nothing but a trick to 'unload' copper shares or speculative holdings of copper. Perhaps this time the movement is genuine, and we are actually threatened with the 'copper famine' of which they tell us. The thing is possible. But do not let us put too much faith in it."

These guileless Frenchmen seem to have been "stung" once or more and are now wary.

Well, anyhow, manipulation or no manipulation, the high price of copper is already having its effect on the consumption; orders for finished copper products show a considerable falling off; new enterprises are being postponed, and the biggest project of all—the electrification of the railroads—has been pretty well abandoned, for this year, anyway, and yet last fall this was one of the strongest features for an increased consumption for the current year.

Statistically, the metal is in good shape, but this has all been discounted. The exports this month are comparatively small—22,341 tons against an average of 30,065 tons for the first three months of 1912. The foreign statistics do not show much change during the month, being a difference of only 400 tons (about 896,000 pounds), while the average decrease in the European pounds. There is likely to be quite an increase in production, some estimates running to 200,000,000 pounds for the year, and it is to be noted that the first quarter of 1912 already shows an increase of about 50,000,000 pounds. The copper producers' figures for the month of April will probably show a slight increase in the stocks. This won't help the wicked manipulators, and is more than likely to put a damper on the buying fervor of the American consumer. The market today is very dull and 16 cents for Lake is not obtainable.

Lake is quotable at 16 cents, electrolytic 15⅞, casting 15¾.

TIN.

This metal has got one of its bad jags again—£206 in London and still going. The move of the board of managers of the London Metal Exchange to eliminate trading in Straits tin from the floor has had no effect on the "corner" or the syndicate. They seem to be able to play the game just as well without the exchange. Statistically, the metal is strong, and with good consuming months in America, prices can easily be lifted wherever the controlling bull syndicate like to put it. The visible supply of tin is only 11,893 tons, a decline in stocks of nearly 4,000 tons this month.

Tin is quotable today at close to 46¼ cents, against 43 cents a month ago, and London is £206 against £186. Tin in London has been up to £215, but today is back to £206 15s.

LEAD.

The lead market has ruled rather easier. The Trust seems to have filled up consumers pretty well, and the outside sellers are knocking the market. Spot lead is quotable at 4.17½ New York against the Trust price, 4.20.

SPELTER.

This metal is very firm and apparently difficult to find. Sales have been made lately at 6.80. East St. Louis and New York delivery is quoted at 6.90.

ALUMINUM.

The market is rather stronger again at 19½ to 20 cents for round lots, 98-99 per cent. ingots against 19¼ a month ago. Small lots are quotable at 20¼ to 21 cents.

ANTIMONY.

No change in prices. Cooksons is quotable at 8 cents, Halletts 7¾, and Chinese at 6⅞.

SILVER.

The market has been very active and prices have been run up to 60⅛ New York, the highest, and 27*d*. London, closing at 60 cents and 26¾*d*.

QUICKSILVER.

Market is easier again at $41 per flask wholesale and $41.50 to $42 for jobbing lots.

SHEET METALS.

There has been no further advance in either sheet copper or wire. Sheet is quoted at 21 cents base for hot rolled, and 22 for cold. Wire is 17 cents base. Brass products all 25 cents higher; high sheet brass 17 cents base.

OLD METALS.

The old metal market is not very happy. There is a fair movement for copper scrap, but there is very little margin of profit, and, compared with the high price of ingot, the scrap values are not in it. The foreign demand is very poor.—J. J. A.

COPPER PRODUCTION

As we go to press too early this month to obtain the copper production figures for April, the figures for April and May will be published in the June issue.—Ed.

APRIL MOVEMENTS IN METALS

	Highest.	Lowest.	Average.
Copper.			
Lake	16.10	15.85	16.00
Electrolytic	15.95	15.75	15.85
Casting	15.85	15.60	15.75
Tin	46.55	43.10	44.10
Lead	4.30	4.20	4.25
Spelter	6.90	6.80	6.85
Antimony (Hallett's)	7.75	7.75	7.75
Silver	61.25	58.12	59.25

WATERBURY AVERAGE

The average price of lake copper per pound as determined monthly at Waterbury, Conn.:

1911—Average for year 12¾. 1912—January, 14½; February, 14½; March, 15; April, 16 cents.

DAILY METAL PRICES

We have made arrangements with the New York Metal Exchange by which we can furnish our readers with the Official Daily Market Report of the Exchange and a year's subscription to THE METAL INDUSTRY for the sum of $10. The price of the Report alone is $10. Sample copies furnished for the asking. We can furnish daily telegraphic reports of metal prices. Address THE METAL INDUSTRY, 99 John street, New York.

INFORMATION BUREAU

Any firm intending to buy metals, machinery or supplies, and desiring the names of the various manufacturers and sellers of these products can obtain the desired information by writing to THE METAL INDUSTRY. Commercial questions are answered by return mail. Our Information Bureau is for the purpose of answering questions of all kinds. Address THE METAL INDUSTRY, 99 John street, New York.

Metal Prices, May 6, 1912

NEW METALS.	Price per lb. Cents.
COPPER—PIG, BAR AND INGOT AND OLD COPPER. Duty Free, Manufactured 2½c. per lb.	
Lake, carload lots	16.00
Electrolytic, carload lots	15.85
Casting, carload lots	15.75
TIN—Duty Free.	
Straits of Malacca, carload lots	46.00
LEAD—Duty Pigs, Bars and Old, 2½c. per lb.; pipe and sheets, 2⅜c. per lb.	
Pig lead, carload lots	4.20
SPELTER—Duty 1⅜c. per lb. Sheets, 1⅝c. per lb.	
Western, carload lots	6.90
ALUMINUM—Duty Crude, 7c. per lb. Plates, sheets, bars and rods, 11c. per lb.	
Small lots	25.00
100 lb. lots	20.00
Ton lots	20.00
ANTIMONY—Duty 1½c. per lb.	
Cookson's cask lots, nominal	8.00
Hallett's cask lots	7.75
Chinese	6.75
Hungarian grade	6.75
NICKEL—Duty Ingot, 6c. per lb. Sheet, strips and wire 35 per cent. ad valorem.	
Shot, Plaquettes, Ingots, Blocks according to quantity	.40 to .50
MANGANESE METAL—Duty 20 per cent	.90
MAGNESIUM METAL—Duty 3 cents per pound and 25 per cent. ad valorem (100 lb. lots)	1.50
BISMUTH—Duty free	2.00
CADMIUM—Duty free	.90
CHROMIUM METAL—Duty 25 per cent. ad val	.98
QUICKSILVER—Duty 7c. per lb	.60
	Price per oz.
GOLD—Duty free	$20.67
PLATINUM—Duty free	45.25
SILVER—Duty free	.60⅛

Dealers' Buying Prices. Cents per lb.	OLD METALS.	Dealers' Selling Prices. Cents per lb.
13.50 to 13.75	Heavy Cut Copper	14.75 to 15.00
13.25 to 13.50	Copper Wire	14.25 to 14.50
11.75 to 12.00	Light Copper	12.75 to 13.00
11.25 to 11.50	Heavy Mach. Comp	12.50 to 12.75
8.75 to 9.00	Heavy Brass	10.00 to 10.25
6.75 to 7.00	Light Brass	8.00 to 8.25
8.25 to 8.50	No. 1 Yellow Brass Turnings	9.25 to 9.50
9.75 to 10.00	No. 1 Comp. Turnings	10.75 to 11.25
3.50 to ——	Heavy Lead	—— to 3.75
4.75 to ——	Zinc Scrap	—— to 5.25
6.00 to 6.50	Scrap Aluminum, turnings	7.00 to 9.00
10.00 to 12.00	Scrap Aluminum, cast, alloyed	11.00 to 13.00
14.00 to 15.00	Scrap Aluminum, sheet (new)	16.00 to 17.50
23.00 to 24.00	No. 1 Pewter	25.00 to 26.00
20.00 to 23.00	Old Nickel	23.00 to 26.00

INGOT METALS.	Price per lb. Cents.
Silicon Copper, 10% ..... according to quantity	27 to 32
Silicon Copper, 20% ..... " "	30 to 32
Silicon Copper, 30% guaranteed " "	32 to 34
Phosphor Copper, guaranteed 10% " "	22 to 25
Phosphor Copper, guaranteed 15% " "	23 to 29
Manganese Copper, 25% ..... " "	35 to 40
Phosphor Tin, guaranteed 5% .. " "	49 to 50
Phosphor Tin, no guarantee .... " "	51 to 53
Brass Ingot, Yellow ..... " "	11 to 11⅜
Brass Ingot, Red ..... " "	12½ to 14
Bronze Ingot ..... " "	14¼ to 14⅝
Manganese Bronze ..... " "	18½ to 20
Phosphor Bronze ..... " "	13 to 16
Casting Aluminum Alloys ..... " "	17⅜ to 20
PHOSPHORUS—Duty 18c. per lb.	
According to quantity	30 to 35

PRICES OF SHEET COPPER.

BASE PRICE, 21.00 Cents per Lb. Net.

PRICES MENTIONED BELOW ARE FOR QUANTITIES OF 100 LBS. AND OVER.

SIZE OF SHEETS.		64 oz. and over 60 lb. sheet 30 x 60 and heavier.	32 oz. to 64 oz. 25 to 50 lbs. sheet 30 x 60.	24 oz. to 32 oz. 18¾ to 25 lb. sheet 30 x 60.	16 oz. to 24 oz. 12½ to 18¾ lb. sheet 30 x 60.	14 oz. and 15 oz. 11 to 12½ lb. sheet 30 x 60.	12 oz. and 13 oz. 9⅛ to 11 lb. sheet 30 x 60.	10 oz. and 11 oz. 7¾ to 9⅛ lb. sheet 30 x 60.	8 oz. and 9 oz. 6¼ to 7¾ lb. sheet 30 x 60.	Lighter than 8 oz.
		Cents Per Pound Over Base Price for Soft Copper								
Not wider than 30 ins.	Not longer than 72 inches.	Base	Base	Base	Base	1	2	3	6	9
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	1	3	6	9	
	Longer than 96 inches.	"	"	"	"	2	6			
Wider than 30 ins. but not wider than 36 inches.	Not longer than 72 inches.	"	"	"	"	2	4	7	10	
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	2	6	9		
	Longer than 96 inches. Not longer than 120 inches.	"	"	"	1	3				
	Longer than 120 inches.	"	"	1	2					
Wider than 36 ins. but not wider than 48 inches.	Not longer than 72 inches.	"	"	1	2	4	7	10		
	Longer than 72 inches. Not longer than 96 inches.	"	"	1	3	5	8			
	Longer than 96 inches. Not longer than 120 inches.	"	"	2	4	8				
	Longer than 120 inches.	"	1	3	6					
Wider than 48 ins. but not wider than 60 inches.	Not longer than 72 inches.	"	Base	1	3	6	11			
	Longer than 72 inches. Not longer than 96 inches.	"	"	2	4	9				
	Longer than 96 inches. Not longer than 120 inches.	"	1	3	6					
	Longer than 120 inches.	1	2	4	8					
Wider than 60 ins. but not wider than 72 ins.	Not longer than 96 inches.	Base	1	3	8					
	Longer than 96 inches. Not longer than 120 inches.	"	2	5	10					
	Longer than 120 inches.	1	3	8						
Wider than 72 ins. but not wider than 108 ins.	Not longer than 96 inches.	1	3	6						
	Longer than 96 inches. Not longer than 120 inches.	2	4	7						
	Longer than 120 inches.	3	5	9						
Wider than 108 ins.	Not longer than 132 inches.	4	6							
	Longer than 132 inches.	5	8							

The longest dimension in any sheet shall be considered at its length.

CIRCLES, SEGMENTS AND PATTERN SHEETS, advance over prices of Sheet Copper required to cut them from 3 cents per pound.

COLD OR HARD ROLLED COPPER, 14 oz. per square foot, and heavier, add ..... 1 " " "

COLD OR HARD ROLLED COPPER, lighter than 14 oz., per square foot, add ..... 2 " " "

POLISHED COPPER, 20 INCHES WIDE and under, advance over price for Cold Rolled Copper of corresponding dimensions and thickness ..... 1 " " sq. ft.

POLISHED COPPER, WIDER THAN 20 INCHES, advance over price for Cold Rolled Copper of corresponding dimensions and thickness ..... 2 " " " "

COLD ROLLED COPPER, PREPARED SUITABLE FOR POLISHING, same as Polished Copper of corresponding dimensions and thickness.

COLD ROLLED AND ANNEALED COPPER SHEETS OR CIRCLES, same price as Cold or Hard Rolled Copper of corresponding dimensions and thickness.

ROUND COPPER ROD, ⅜ inch diameter or over ..... **Base Price.**

(Rectangular, Square and Irregular Shapes, Copper Rod, Special Prices.)

	Cents per lb.
ZINC—Duty, sheet, 1⅝c. per lb.	
Carload lots, standard sizes and gauges, at mill	8.65 less 8%
Casks, jobbers' prices	9¼
Open casks, jobbers' prices	9¾

Metal Prices, May 6, 1912

PRICES ON BRASS MATERIAL—MILL SHIPMENTS.

In effect May 1, 1912, and until further notice.

To customers who buy over 5,000 lbs. per year.

	Net base per lb.		
	High Brass.	Low Brass.	Bronze.
Sheet	$0.15⅜	$0.17⅜	$0.19
Wire	.15½	.17⅜	.19
Rod	.15½	.18⅛	.20
Brazed tubing	.20¼	—	.23¾
Open seam tubing	.19⅛	—	.21¾
Angles and channels, plain	.19½	—	.22¼

50% discount from all extras as shown in American Brass Manufacturers' Price List No. 8.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring drawing and spinning brass	½c.	per lb. net advance
" —Best spring, drawing and spinning brass	1½c.	" " " "
Wire —Extra spring and brazing wire	½c.	" " " "
" —Best spring and brazing wire	1c.	" " " "

To customers who buy 5,000 lbs. or less per year.

	Net base per lb.		
	High Brass.	Low Brass.	Bronze.
Sheet	$0.17	$0.18⅝	$0.20¼
Wire	.16¾	.18⅝	.20¼
Rod	.16¾	.19⅜	.21¼
Brazed tubing	.21½	—	.25
Open seam tubing	.20⅜	—	.23
Angles and channels, plain	.20¾	—	.23½

5% discount from all extras as shown in American Brass Manufacturers' Price List No. 8.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring drawing and spinning brass	½c.	per lb. net advance
" —Best spring, drawing and spinning brass	1½c.	" " " "
Wire —Extra spring and brazing wire	½c.	" " " "
" —Best spring and brazing wire	1c.	" " " "

BARE COPPER WIRE—CARLOAD LOTS.

17.50 per lb. base.

SOLDERING COPPERS.

300 lbs. and over in one order	19c.	per lb. base
100 lbs. to 300 lbs. in one order	19½c.	" " "
Less than 100 lbs. in one order	21c.	" " "

PRICES FOR SEAMLESS BRASS TUBING.

From 1¼ to 3½ O. D. Nos. 4 to 13 Stubs' Gauge, 20c. per lb.
Seamless Copper Tubing, 23c. per lb.

For other sizes see Manufacturers' List.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron pipe Size	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
Price per lb.	28	27	22	21	20	20	20	20	20	20	20	21	22	24	26	27

PRICE LIST OF IRON LINED TUBING—NOT POLISHED.

	Per 100 feet	
	Brass.	Bronze.
⅜ inch	$8	$9
½ inch	8	9
⅝ inch	10	11
¾ inch	12	13
⅞ inch	14	15
1 inch	18	20
1¼ inch	22	24
1¼ inch	25	27
1½ inch	32	35
1¾ inch	45	48
2 inch	56	60

Discount 50%.

PRICES FOR TOBIN BRONZE AND MUNTZ METAL.

Tobin Bronze Red	17½c.	net base
Muntz or Yellow Metal Sheathing (14" x 48")	16½c.	" "
" " " Rectangular sheets other than Sheathing	18½c.	" "
" " " Rod	16½c.	" "

Above are for 100 lbs. or more in one order.

PLATERS' METALS.

Platers' bar in the rough, 25¼c. net.

German silver platers' bars dependent on the percentage of nickel, quantity and general character of the order.

Platers' metal, so called, is very thin metal not made by the larger mills and for which prices are quoted on application to the manufacturers.

PRICES FOR SHEET BLOCK TIN AND BRITANNIA METAL.

Not over 18 in. in width, not thinner than 28 B. S. Gauge, 2c. above price of pig tin in same quantity.

Not over 35 in. in width, not thinner than 22 B. S. Gauge, 3c. above price of pig tin.

PRICE SHEET FOR SHEET ALUMINUM—B. & S. Gauge.

Wider than..... and including.....	3in. 12in.	6in. 14in.	14in. 16in.	16in. 18in.	18in. 20in.	20in. 24in.	24in. 30in.	30in. 36in.	36in. 40in.
	in coils.								
No. 13 and heavier	34	34	36	36	36	36	39	39	39
" 14	34	34	36	36	36	36	39	39	39
" 15	34	34	36	36	36	36	39	39	39
" 16	34	34	36	36	36	36	39	39	39
" 17	34	34	36	36	36	36	39	39	39
" 18	34	34	36	36	36	36	39	39	42
" 19	34	34	36	36	36	36	39	40	43
" 20	34	36	36	36	36	38	41	42	44
" 21	34	38	38	38	38	40	43	44	50
" 22	34	38	38	38	40	40	43	47	51
" 23	34	38	38	38	40	40	43	49	52
" 24	34	38	40	42	42	42	45	51	54
" 25	36	39	41	43	43	43	46	53	57
" 26	36	39	42	46	46	46	51	55	61
" 27	36	40	44	48	48	49	54	58	64
" 28	36	40	46	48	49	49	56	62	67
" 29	38	41	48	50	52	52	61	67	72
" 30	38	42	50	52	56	62	69	72	77
" 31	43	47	55	58	63	71	74	77	83
" 32	45	49	57	61	69	77	91	90	95
" 33	47	51	60	65	73	84	91	100	110
" 34	50	55	62	70	78	91	103	110	120
" 35	..	65	70	80	90	100	115	125	..
" 36	..	80	90	100	115	120	135	..	..
" 37	..	104	114	129	144	159	174	..	..
" 38	..	124	139	154	169	184	204	..	..
" 39	..	144	164	184	204	224	..	..	..
" 40	..	174	204	224	244	..	..	..	..

In flat rolled sheets the above prices refer to lengths between 2 and 3 feet. Prices furnished by the manufacturers for wider and narrower sheet. All columns except the first refer to flat rolled sheet. Prices are 100 lbs. or more at one time. Less quantities 5c. lb. extra. Charges made for boxing.

PRICE LIST SEAMLESS ALUMINUM TUBING.

STUBS' GAUGE THE STANDARD. SIZES CARRIED IN STOCK.
Outside Diameters. BASE PRICE, 25 Cents per Pound.

Stubs' Gauge.	Inches.	¼ in.	5-16 in.	⅜ in.	½ in.	⅝ in.	¾ in.	⅞ in.	1 in.	1¼ in.	1½ in.	1¾ in.	2 ins.	2½ ins.	3 ins.	3½ ins.	4 ins.	4½ ins.
11.	.120.	..	..	..	..	..	..	..	27	24	..	..	14	20	10	9	16	23
12.	.109.	..	..	..	..	..	..	..	26	..	..	..	15	..	..	..	..	..
14.	.083.	..	..	..	..	..	..	..	..	..	..	..	17	..	..	..	..	..
16.	.065.	..	..	..	..	..	28	27	27	24	23	21	21	21	21	27	31	57
18.	.049.	..	..	..	..	33	30	29	28	25	26	26	26	..	..	..	..	..
20.	.035.	117	..	46	39	34	33	32	30	29	30	30	30	31	38	49	58	81
21.	.032.	..	..	..	40	..	..	..	..	..	..	..	..	..	..	..	..	..
22.	.028.	138	98	48	42	38	37	35	34	..	..	45	..	..	..	..	..	..
24.	.022.	188	133	108	88	79	73	62	60	66	..	..	..	..	..	..	..	..

Prices are for ten or more pounds at one time. For prices on sizes not carried in stock send for Manufacturers' List.

PRICE LIST FOR ALUMINUM ROD AND WIRE.

Diameter. B. & S. G'ge	000 to No. 10.	No. 11.	No. 12.	No. 13.	No. 14.	No. 15.	No. 16.	No. 17.	No. 18.	No. 19.	No. 20.	No. 21.	No. 22.
Price, per lb.	32	32½	32½	33	33½	34	34½	35	36	37	38	43	46

PRICE LIST FOR GERMAN SILVER IN SHEETS AND ROLLS.

Per cent.	Price per lb.	Per cent.	Price per lb.
12	$0.52	16	$0.58
13	.53	17	.59
14	.54	18	.60
15	.55		

These prices are for sheets and rolls over 2 inches in width, to and including 8 inches in width and to No. 20, inclusive. American or Brown & Sharpe's Gauge. Prices are for 100 lbs. or more of one size and gauge in one order. Discount 50%.

GERMAN SILVER TUBING.

4	per cent.	to	No. 19, B. & S. Gauge,	inclusive	$0.60
6	"	"	19, "	"	.70
9	"	"	19, "	"	.85
12	"	"	19, "	"	1.00
15	"	"	19, "	"	1.15
16	"	"	19, "	"	1.20
18	"	"	19, "	"	1.30

German Silver Tubing thinner than No. 19 B. & S. Gauge add same advances as for Brazed Brass Tube.

For cutting to special lengths add same advances as for Brazed Brass Tube. Discount 40%.

PRICES OF SHEET SILVER.

Rolled sterling silver .925 fine is sold according to gauge quantity and market conditions. No fixed quotations can be given, as prices range from 2c. below to 6c. above the price of bullion.

Rolled silver anodes .999 fine are quoted at 2c. to 3½c. above the price of bullion.